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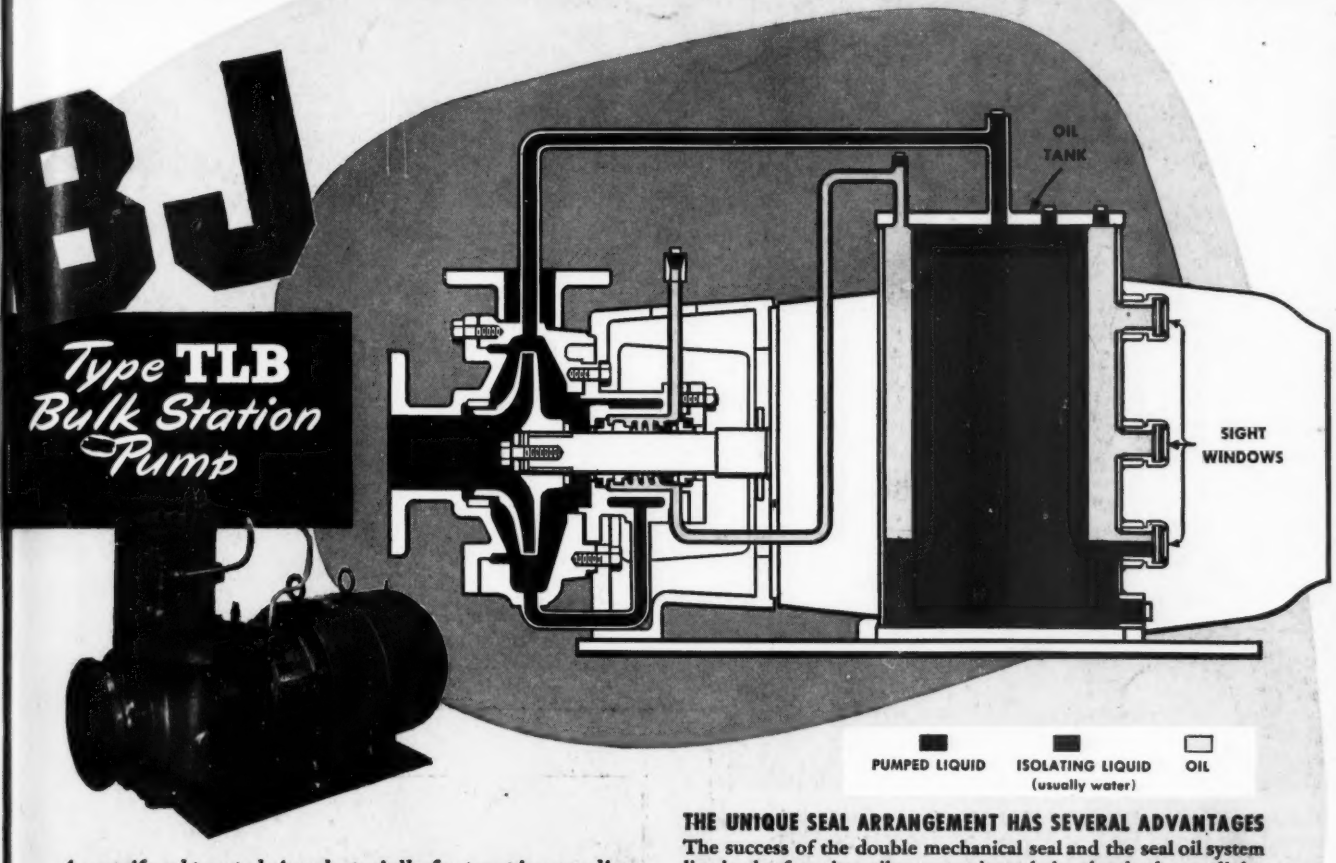
The OIL AND GAS JOURNAL

he SEAL OIL SYSTEM—means no leakage of costly inflammable liquids

BJ

Type **TLB** *Bulk Station Pump*



A centrifugal pump designed especially for pumping gasoline, butane, propane, kerosene, stove oil, lubricating oils, diesel fuel, paint thinner and other hydrocarbons.

The TLB is a single suction, single stage centrifugal pump of the BJ Bilton type (pump close-coupled to an induction motor with a single shaft common to both).

A double mechanical seal, contained in an oil-filled, liquid-cooled seal chamber, replaces the conventional stuffingbox. And a special two-compartment oil tank connects pump discharge to seal chamber in such a way that seal chamber is filled with oil at discharge pressure but the oil is isolated from pumped liquid. Original filling of oil will last a year or more.

THE UNIQUE SEAL ARRANGEMENT HAS SEVERAL ADVANTAGES

The success of the double mechanical seal and the seal oil system lies in the fact that oil pressure in seal chamber is always slightly higher than pressure at entrance to inner seal . . . because of the pumping action of impeller shroud and hub.

1. NO LEAKAGE of costly, inflammable liquids through seal chamber.
2. GOOD LUBRICATION of ground seal faces is maintained by leakage of lubricating oil from seal chamber even though pump loses suction. This leakage is so minute that no trace can be found in the pumped liquid.
3. NO CORROSION of seal parts regardless of liquid pumped.

Byron Jackson Co.

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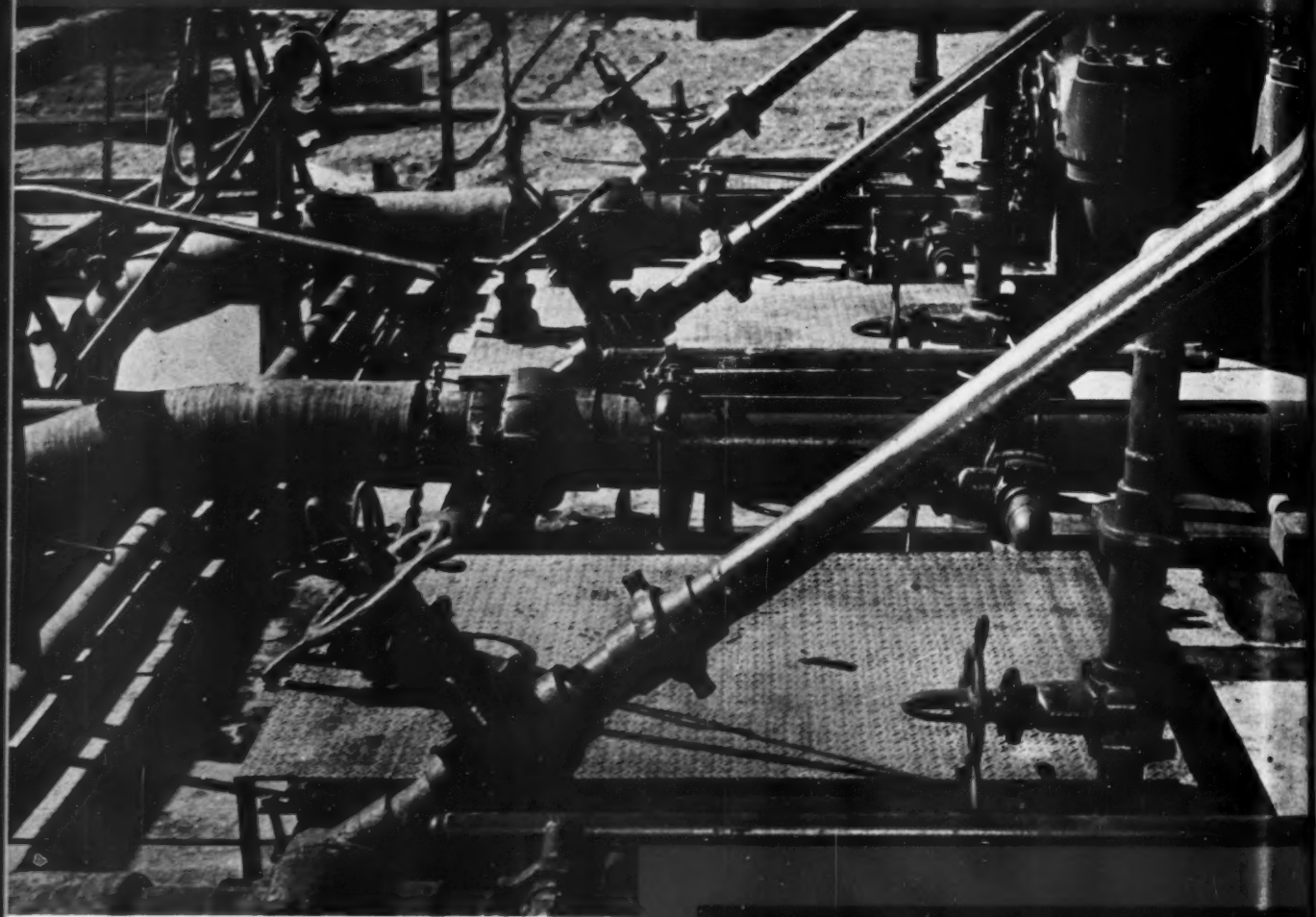
Your drilling rig is your "repair shop" for

CAMERON *FLEX-SEAL* MUD VALVES

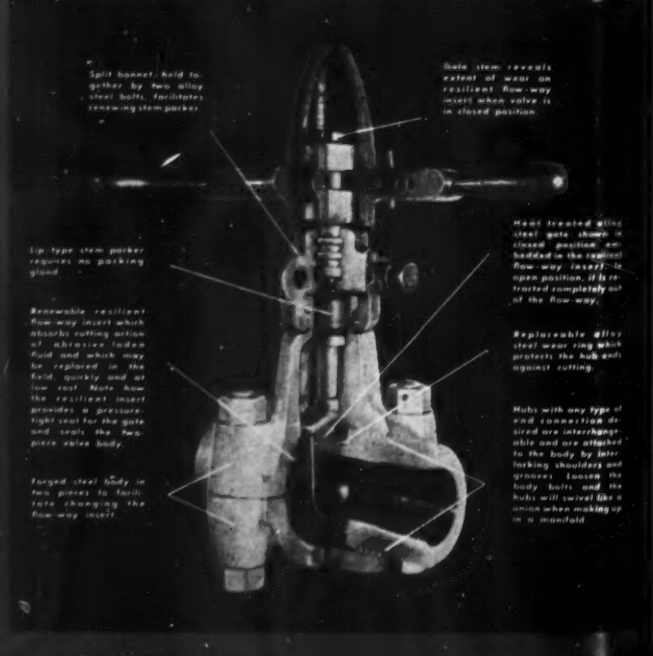


Not even Cameron Flex-Seal Mud Line Valves, with their remarkable record for long life and trouble-free performance, can stay in service indefinitely without repairs. When that time comes, however, you won't have to take your "Flex-Seals" out of service and send them to a valve repair shop. Any roughneck can completely overhaul a "Flex-Seal" right at the rig. No special tools or skill are required.

Cameron Flex-Seal Mud Line Valves were designed to do a specific job . . . provide a pressure-tight closure in a mud line when called upon and to resist the cutting action of abrasive-laden drilling fluid moving at high velocity. Consequently, the conventional metal-to-metal seat was replaced by a renewable resilient flow-way insert which slowly absorbs the abrasive action of the fluid and, after long service, may be quickly and easily replaced at low cost.

The cross-section view of a "Flex-Seal" at right clearly illustrates its unique design and shows the gate in closed position. Trash or other foreign matter trapped in the valve is embedded in the resilient flow-way insert when the gate is closed, so that a pressure-tight seal is assured at all times.

Complete details will gladly be sent to interested operators on request.


Split bonnet, held together by two alloy steel bolts, facilitates renewing stem packer.
Gate stem reveals extent of wear on resilient flow-way insert when valve is in closed position.
Lip-type stem packer requires no packing gland.
Renewable resilient flow-way insert which absorbs cutting action of abrasive laden fluid and which may be replaced in the field, quickly and at low cost. Note how the resilient insert provides a pressure-tight seal for the gate and seals the two-piece valve body.
Heat treated alloy steel gate shown in closed position embedded in the resilient flow-way insert. In open position, it is retracted completely out of the flow-way.
Replaceable alloy steel wear ring which protects the hub ends against cutting.
Forged steel body in two pieces to facilitate changing the flow-way insert.
Hubs with any type of end connection desired are interchangeable and are attached to the body by interlocking shoulders and grooves. Loosen the body bolts and the hubs will swivel like a union when making up in a manifold.

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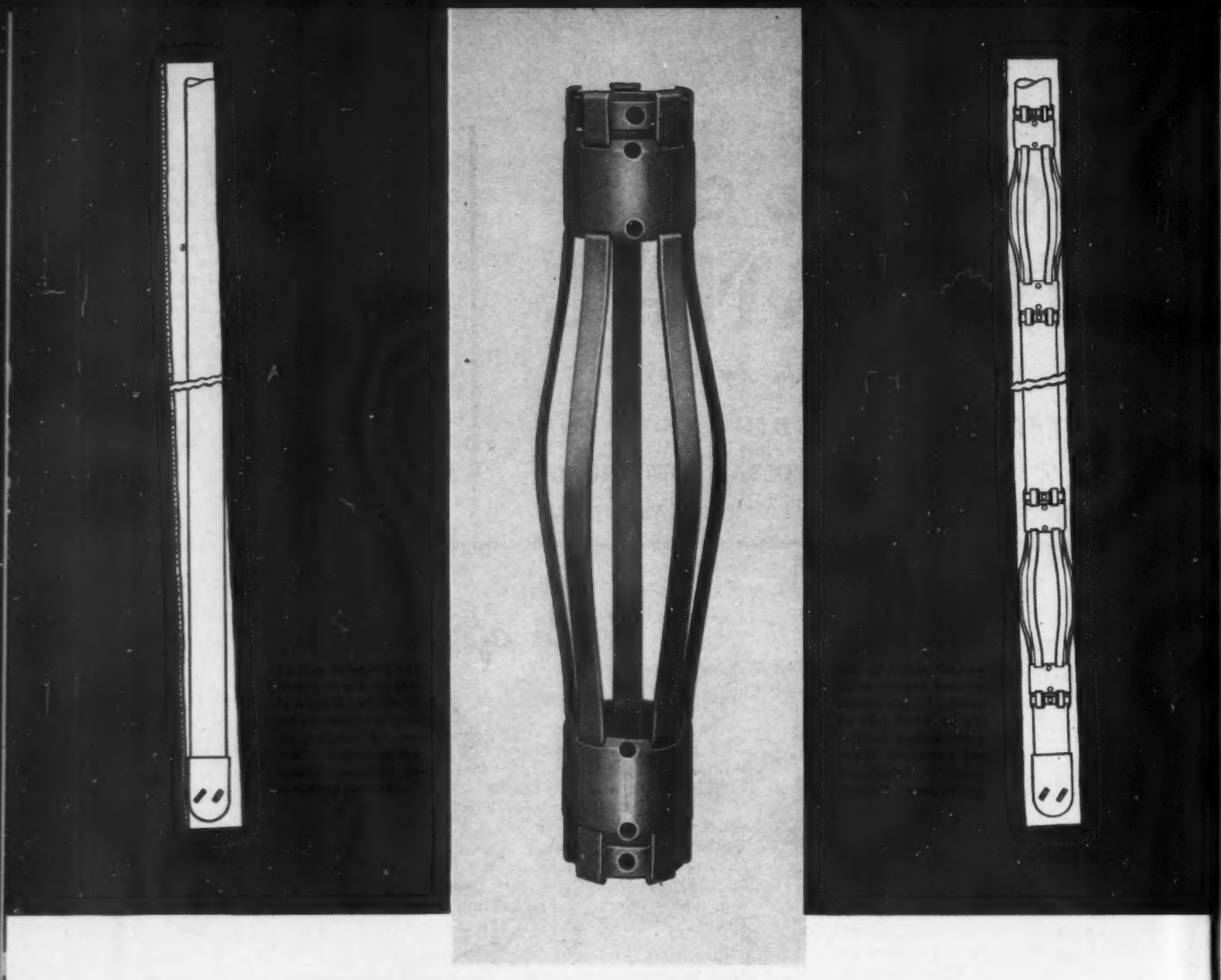

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Inflation

J. HOWARD PEW, replying to vicious and unwarranted attacks on the Sun interests by labor spokesmen, in a radio talk, discussed briefly the "real causes" of inflation. His conclusions are contained in two sentences: "Price increases no more cause inflation than wet streets cause rain. Wet streets are the result of rain and rising prices are one of the many disastrous results in the wake of inflation."

In the frantic efforts since the first of the month to "do something" about price controls, it is apparent that a substantial part of the Washington leadership either has no conception of the causes of spiraling prices, or lacks the political courage to apply basic remedies.

Indicative of the current approach to the solution of price problems is the ready acceptance of agricultural subsidies as cures in the determination of food price ills. Where prices have advanced to offset the government handouts they are pointed to as inflationary reactions. These subsidy proponents profess to see nothing inflationary in printing another billion or more dollars in bonds to pay gratuities, and adding them to a national debt long since so large that it bears no understandable relationship to the sound phases of our business life. They also support demands for wage increases but insist there is no reason why these advances should be reflected in higher prices for products.

Further evidence of the desire to keep away from fundamentals in the solution of problems is the apparent calm acceptance of a Senate-passed 11½-billion-dollar appropriation for the military covering its activities for 1 year. This figure, the largest in peacetime history, is 2½ times all annual federal expenditures during the twenties. The planned Army and Navy outlays even exceed the yearly totals preceding the war, when this country was attempting to lift itself out of a depression by its bootstraps through government spending. Many other budget items are comparable in relation to prewar levels.

In fact, unless Congress sets up adequate postwar restrictions quickly the middle and late thirties will be rated as the amateur or warmup period in the application of the New Deal philosophy of saving the country by spending, largely financed by public debt. Professional spenders of long experience are now in charge of many departments of Government.

From this prewar and threatening postwar waste of public funds plus the war debt come the pressures which are reflected in the price of butter and thousands of other commodities. Ending of the flood of inflationary trends rests in controlling the headwaters with good government and a sound national economy, and not in futile attempts to plug the holes of the leaky dike of price regulations.

Pennsylvania Grade Crude Buyers Consider Retroactive Boost

A GENERAL policy of either paying the subsidy price on Pennsylvania Grade crude retroactive to July 1 under any new law that may be enacted by the federal Government, if possible; or posting a price increase retroactive to July 1, in event no new subsidy law is passed—with the retroactive feature of the price increase affecting only crude bought under standing purchase orders—appears to be crystallizing among major Pennsylvania Grade crude purchasers.

Sales of crude on the spot market will not be affected by any retroactive price increase, although they may come under any restoration of subsidy, depending on the wording of the new law, if any.

Crude-oil purchasers in other districts pointed out that such a course was impractical for them. Their problem is much more complicated than that of the Pennsylvania Grade purchasers. All Pennsylvania Grade crude carries a flat subsidy of 75 cents per barrel, regardless of rate of production per well. They point out that the Pennsylvania Grade purchasers can advance the price 75 cents per barrel and thereby replace the subsidy, without setting up any differences in treatment of the various crude producers.

In other parts of the country, some production carries varying rates of subsidy from 10 to 35 cents per barrel, while other nearby production, purchased by the same crude buyer, carries no subsidy whatever. Numerous investigations and discussions have long since developed that it is a fact that only a government can maintain a two-price system, and that competing purchasers operating in a free market cannot discriminate among customers in this way.

Retroactive price increases, even if legal, would have to affect nonsubsidized production in exactly the same amount as subsidized production. Furthermore the accounting procedures are much more complicated, and the long-term contract system of buying crude is not as widespread as in the Pennsylvania Grade area. The entire situation is attracting widespread attention among small-well operators who in effect have suffered a loss in price through discontinuance of the subsidy payment.

NPC Organizing Committee Discusses Plans for Activating Group

WASHINGTON.—Plans for activating the National Petroleum Council were under discussion in Washington this week by a temporary organizing committee appointed by Walter S. Hallanan, temporary chairman of the NPC. Appointment of a committee of 15 was authorized at the first council meeting June 21, but selection of members was not made until July 3.

Prior to meeting formally with Krug and Davies, the committee discussed many aspects of the council plan in an informal way and, according to Chairman Hallanan, it was unanimously agreed that the industry can work out a program of cooperation with the Government which will be mutually helpful and satisfactory.

Hallanan said this cooperation presents certain legal problems which will have to be studied carefully but it was felt that much could be done within the framework of the attorney-general's letter to Krug. The chairman was directed to appoint three subcommittees on scope of procedure, organization and staff, and legal problems, which are to be organized promptly and report back in time for the committee of 15 to complete a report for the next council meeting.

In notifying the members of their appointments, the chairman asked them to meet July 9 to discuss the type of organization and the scope of authority and function of the council. Officials of the Interior Department also attended the meeting, including Secretary Krug and Ralph K. Davies, acting director of the Oil and Gas Division. The next meeting of the council is expected to be called for some time in September.

Those appointed to the organizing committee are O. D. Donnell, president, Ohio Oil Co.; J. Frank Drake, president, Gulf Oil Corp.; B. A. Hardy, Shreveport, La., president, Independent Petroleum Association of America; George A. Hill, Jr., president, Houston Oil Co. of Texas; Eugene Holman, president, Standard Oil Co. (N. J.); A. Jacobsen, president, Amerada Petroleum Corp.; B. Brewster Jennings, president, Socony-Vacuum Oil Co., Inc.; W. Alton Jones, president, Cities Service Co.; B. L. Majewski, vice president, Deep Rock Oil Corp.; A. C. Mattei, president, Honolulu Oil Corp.; J. Howard Pew, president, Sun Oil Co.; Joseph E. Pogue, Chase National Bank, New York; Frank M. Porter, president, Mid-Continent Oil & Gas Association; Charles F. Roeser, president, Roeser & Pendleton, Inc., and Robert E. Wilson, chairman of the board, Standard Oil Co. (Ind.)

Louisiana Legislature Kills Gas-Tax Bill

THE Louisiana Legislature last week in Baton Rouge killed the proposed natural-gas tax bill, while another far-reaching measure authorizing the State Conservation Commission to fix minimum field gas prices was reported favorably to the Senate.

The bill levying a sales tax on natural gas was first amended to reduce the rate from 3 cents to 2 cents per 1,000 cu. ft. Despite another amendment reducing the rate to 1½ cents, the house defeated the plan by a 43-43 tie vote. Louisiana's present gas tax is ½ cent per 1,000 cu. ft.

The proposal is now considered dead. It was advocated by some state officials as a conservation measure which would curb gas export. Industry representatives vigorously opposed the plan asserting the tax would discourage industrial expansion in the state.

First Such Bill Proposed

The minimum-price proposal has aroused widespread interest. It is the first comprehensive bill giving a state regulatory body power to set gas prices to be introduced in any state legislature. The Independent Natural Gas Association of California, commenting on the proposal in a bulletin, said the "concept of a minimum price imposed by a state on a privately owned commodity is new and may have far-reaching implications."

The bill is now on the Senate calendar for final passage. It was advanced as a conservation scheme on the contention that sale of a natural resource below its economic value constitutes waste.

Coal and Rail Interests Plead For Protection Against Gas

by Henry D. Ralph

WASHINGTON.—Widespread use of natural gas in eastern and middle western cities would seriously injure the bituminous coal industry and deprive the railroads of much needed coal traffic, the Federal Power Commission was told last week by a group of spokesmen for the coal and railroad industries.

Participating in the FPC natural-gas investigation, these representatives presented numerous exhibits to show the national importance of the coal mining and handling industry and the volume of employment in producing and distributing coal. The inference was that the commission should protect this employment by refusing to permit the construction of additional natural-gas transmission pipe lines, but when questioned the witnesses avoided making such a flat statement. In fact, their direct testimony suffered considerably under cross examination by commission examiners and attorneys for the natural-gas industry, and about the only definite conclusion was that coal and railroad interests do not like competition from natural gas.

Railroads Buying More Fuel Oil

For example, spokesmen for the American Association of Railroads asserted that the nation needs strong railroads and that the coal which might be displaced by natural gas is an important part in railroad revenue. But they admitted that railroads themselves have been increasing their purchases of diesel oil and fuel oil at more rapid rates than their use of coal. They protested against subsidies to other forms of transportation which compete with railroads, but had no specific complaints against natural-gas pipe lines except that they resulted in displacement of coal. They talked about conservation of natural resources but were forced to admit it is better for the nation to pipe natural gas to markets than to let it blow off into the air. They suggested that natural gas use be confined to markets near the areas of production but could not set any mileage limit on what they considered a proper length for a pipe line.

Similarly, several of the coal witnesses laid stress on exhibits they offered to show how much more employment is provided by using coal instead of natural gas, but questioning brought out the fact that their figures were based only on gas transmission companies and did not include production and exploration workers nor employes of manufactured gas plants in areas when this is mixed with natural gas.

Other witnesses opposed to greater use of natural gas were scheduled to occupy the hearings throughout this week, following which the investigation will be devoted to hearing a long list of representatives of the natural-gas industry. This testimony will continue for 2 or 3 weeks and will wind up the investigation which has been proceeding intermittently for nearly a year.

Competition Harasses Rails

C. S. Duncan, American Association of Railroads, offered an exhibit which he said emphasized the need for the preservation of an adequate transportation system in the United States. He also sought to show how other forms of transportation have cut into the railroad business and have obtained subsidies from the Government while, he said, the railroads have not received such subsidies.

While witnesses for the railroads stressed the point of upholding revenue to provide the country with strong railroads by aiding the consumption and hauling of coal, J. H. Parmalee, American Association of Railroads, admitted that of the 585 locomotives now on order as a part of railroad's capital improvements, 516 of these are diesels. These new diesel locomotives represent an increased use of fuel oil by the railroads themselves.

Parmalee also disclosed the fact that the railroads purchased 25 times as much diesel fuel in 1945 than they did in 1935. Use of coal for approximately the same period had increased only twice. Railroads also purchased twice as much fuel oil in 1945 as they did in 1935, he said.

Duncan, when called for cross-exination and asked to explain what bearing his testimony had on the matters under study in this investigation, replied that it had a bearing on facts the FPC should take into consideration in considering applications for certificates for pipe lines; that the railroads are facing keen competition and that natural-gas introduction into new areas would make the job of maintaining a sound railroad system even more competitive. Duncan would not draw any particular conclusions as to what constitutes proper competition.

F. C. Weber, National Coal Association, contended that if FPC would approve all the applications for certificates for pipe lines pending as of May 31, there would be an additional pipe line capacity of 174,162,000,000 cu. ft. for natural gas and that this is the equivalent of 48,175,000 net tons of bituminous coal.

Counsel for the Natural Gas Committee developed the point that all of this gas would not necessarily replace coal and that the exhibit assumed a 100 per cent load factor on all these proposed lines, which probably would not be the case.

Importance of Coal Industry

F. F. Estes, National Coal Association, entered a number of exhibits seeking to show the economic importance of the coal industry. He pointed out that since 1935, bituminous coal has lost ground to natural gas from the standpoint of retail deliveries of coal, as compared to the sale of domestic and commercial gas. He said that with more gas-burning equipment being made available, and an increase in pipe-line construction, gas will go far ahead of coal in the future, unless the expansion of gas markets is curtailed.

Estes presented an exhibit showing the number of employes and the amount of wages paid in the coal industry and in the petroleum and natural gas industries, but this exhibit indicated the average wage paid in the petroleum and natural gas industries was higher than that paid in the coal industry. However, he commented that the average wage paid on a "B.t.u. basis" is higher for coal than for gas.

Summarizing his testimony concerning his exhibits, Estes said that he entertains no fear of a coal shortage this winter, although there may be shortages of certain kinds of coal in particular areas, but that the overall supplies will be adequate. He said he based this assumption on the presumption that there will be no interruption of coal production during the rest of the year, and he said "we anticipate none." He also asserted that there are mines at present that cannot get a market for all of their current production.

In the closing session at week's end, Estes, in answer to questions by Don Culton, counsel for the Natural Gas Committee, agreed that American citizens should be allowed to make free choice of fuel they want to use, both for domestic and industrial purposes, and he conceded that public demand for natural gas has increased recently, at least in part, as a result of public reaction to the coal and railroad strikes.

Socony-Vacuum Announces New Postwar Industrial Products

NEW YORK.—New lubricating oils, new solvents, new synthetic commercial and industrial products have been developed by Socony-Vacuum Oil Co. for postwar applications, according to announcements made at a press conference last week with that company's technical division executives. Most of these products originated from the company's wartime research projects instituted to produce urgently needed materials for prosecuting the war. The variety of applications of many of these products and intermediates is great and they have barely been introduced to commerce and industry.

Reinforcement of mineral lubricating oils by the addition of antioxidants and detergents is relatively new, yet such oils were used exclusively during World War 2 by the U. S. Army to carry the extreme bearing loads in engines and meet the severe conditions then encountered, according to Dr. Paul V. Keyser, Jr., director of Socony-Vacuum research and development laboratories. In 1939 Socony marketed the first nationally distributed oil engine in service stations in which oil was treated with both antioxidants and detergents. The latter materials are soap-type metallic organic salts which disperse solid materials in the oil and prevent their deposition on engine parts. Antioxidants retard and discourage reaction between the oil and oxygen and reduce corrosive acid formation. Other advances include vacuum-pump lubricants which permit the attainment of extremely low vacua used for many new industrial processes such as concentration of uranium isotopes used in the A-bomb.

Problems Presented

The tremendous increase of catalytically cracked domestic distillate fuel oils has presented problems, and some of these have been solved by burner-design improvements worked out by the laboratory under S. P. Cauley and others, which enable the user to burn satisfactorily these lower-priced oils and to permit the burner manufacturer to meet the differing requirements of these oils as compared to the premium-priced straight-run oils formerly used widely. A feature of this development is the provision of a "combustion test kit," developed by Socony-Vacuum laboratories, which may be applied to adjust the burner for the most efficient operation on the individual installation.

Paul V. Keyser, research director, research and development laboratories, Socony-Vacuum Oil Co., Inc., Paulsboro, N. J.

Ethylene gas in 95 per cent purity is being made by an adaptation of the T.C.C. process, now used widely for cracking heavy oils, using small ceramic marbles as heat-transfer medium for the main reaction. These marbles are added to the charge stock at temperatures up to 1,800° F., whereas the highest practical temperature reached in the conventional tube still is of the order of 1,300° F. Ethylene is used as raw material for a large number of syntheses, such as ethyl alcohol, styrene, lubricants, etc. A commercial unit to cost several million dollars is under design to be built soon, it was stated.

Other important developments are the production of several derivatives of thiophene, such as 2-, and 3-methylthiophene, 2-acetylthiophene. These are produced from normal or isobutane and elementary sulfur and are used especially in the drug and dye industries.

Solvent Carriers

Solvent carriers for materials such as D.D.T. with which may be mixed emulsifiers which permit extensive dilution with water to obtain effective emulsions have been developed from petroleum synthetically. Some of these solvents will dissolve up to 55 per cent of their weight of D.D.T., it is reported. Numerous other products such as Sovabead for dehumidifying materials or containers, and liquid plasticizers for making up plastisols of vinyl resins which aid fabrication, have been developed, and are being applied to commercial uses, the conference disclosed.

Collection of MER Data By Compact Proposed

IN connection with new hearings announced by the Texas Railroad Commission to determine maximum efficiency rates for Texas fields, Interstate Oil Compact Commission's monthly newsletter discloses suggestions made that the compact should gather data on maximum efficiency rates at which oil and gas can be produced in the various states and keep such figures up to date.

Some operators are of the opinion that a voluntary system handled by the Compact Commission would function more efficiently than it did while under auspices of Petroleum Administration for War. Various state conservation bodies are said to be in agreement with the plan and E. O. Thompson, member of the Texas Railroad Commission called attention to the matter in a recent letter to the commission.

The Compact Commission feels that it is one of the most important matters in connection with any conservation program and has suggested that various committees at Grand Rapids, Mich., study the proposal.

Series of Hearings

A series of hearings called by the Texas Railroad Commission to determine new rates in Texas and commission districts to be heard are: District 2, July 23; District 1, July 25; District 3, July 30; District 4, August 6; District 5, August 13; District 6, August 14; District 7-B, August 20; District 7-C, August 21; District 8, August 22; District 9, September 4; District 10, September 10. All meetings are to be held in Austin.

Questions as to what is maximum capacity of Texas fields without preventable waste arose after the commission set its record-high June allowable which permitted virtually all fields in the state to produce at their last-recorded maximum efficient rate.

In its notice of the additional hearings, the commission, as it has done in the case of the other hearings, asked that data be submitted showing reservoir pressure, gas-oil ratio, per cent or barrels of water produced, and rates of oil production for periodic intervals during the producing life of the reservoir, or at least, for periodic intervals during the last 4 years. The data should reflect, where available, average values for each reservoir, the commission said.

THIS 1946 WEEK

S M T W T F S

PRICES—Senate wrangles over OPA revival bill. . . . Observers believe continued delay in passage favors opponents, that time under "free market" conditions will demonstrate no law is needed. . . . Substitute extension bill contains same decontrol provisions as measure vetoed by President. . . . Bill would ultimately force substantial price boost for petroleum, if not complete decontrol. . . . ¶Stripper subsidy would be continued even after oil is decontrolled under new law. . . . ¶Hallanan attacks "fantastic reasoning" of OPA officials in giving heavy gasoline demand as reason for likely decontrol delay. . . . Asks specific oil decontrol provisions in any extension legislation. . . . ¶Products prices steady at or near ceiling levels. . . . Oil markets show little disposition to go beyond former legal limits. . . .

PRODUCTION—Crude output during week ended July 6 shows another decline. . . . National total is 4,919,120 bbl. daily, down 21,670 bbl. from previous week. . . . Texas, with drop of 16,200 bbl. daily, accounts for most of change. . . . ¶New pay zone some 700 ft. shallower than main Weber sand found in Rangely field in test of Continental Oil Co. west outpost. . . .

REFINING—Senate committee offers resolution blocking for 6 months or more sale of much of the Government's synthetic rubber facilities. . . . Resolution proposes delay until further reports on long-range rubber policy are studied. . . . Not affected are styrene, carbon black, alcohol butadiene, and some copolymer plants. . . . ¶Bill giving small refiners preference in the purchase of U. S. royalty oil goes to White House. . . . Provides secretary of interior can determine when open-market supplies are insufficient and sell government oil to plants without a source of supply at not less than current market price.

NATURAL GAS—Coal and railroad representatives tell FPC in Washington hearing that expansion of natural-gas use threatens serious injury to their industries. . . . Ask by inference protection against natural-gas competition. . . . Railroads concede they are increasing diesel and fuel-oil purchases much more than coal. . . . ¶Louisiana Legislature defeats natural-gas sales tax bill. . . . Considers measure allowing State Conservation Commission to fix minimum field price for gas. . . . Oklahoma Corporation Commission this week holds hearing on request that it fix prices for gas in Oklahoma Panhandle. . . . ¶Mexican oil union takes Reynosa Pipe Line Co.'s plan to export gas to Monterrey as occasion for another attack on Petroleos Mexicanos. . . .

CONSUMPTION—Bureau of Mines places July demand at 4,748,000 bbl. daily. . . . Compares to bureau's estimate of 4,790,000 bbl. daily actual demand in May and June. . . . ¶Daily gasoline demand in week ended June 29 figured at 2,152,000 bbl., up 34,000 bbl. from preceding week. . . . ¶Fuel oil consumed in May by nation's electric generating plants sets new monthly record of 3,521,513 bbl. as a result of expanded use during the coal strike. . . .

REGULATION—New 15-man organizing committee of National Petroleum Council meets in Washington to discuss permanent organization. . . . Session prepares for next full council meeting due in September. . . .

The old and new methods of exploitation of oil field discoveries were drawn into sharp contrast by two recent anniversaries in California. The upper scene is at Signal Hill field, Long Beach, where Shell Oil's discovery well 25 years ago opened a new era in the California industry. Occurring when modern recovery methods were u n k n o w n, town-lot development was the rule. The lower photo shows the Ten Section field near Bakersfield discovered 10 years ago and entirely controlled by Shell. Spacing has been for maximum recovery, and except when a well is being drilled or pulled, no derricks are visible. In Ten Section, Shell has drilled 266 wells of which 235 are now producing

What Others Say

In its issue of July 6, page 56, The Oil and Gas Journal published the telegraphed comments of 15 industry leaders following the action of President Truman in vetoing the price control extension legislation. In view of the continued importance of the question, the Journal presents the three more statements which were received too late for inclusion in the July 6 group. Several other significant statements, though not directed specifically to the Journal, also are given here.

Oil Industry's Capacity Adequate to Meet Demand

Sirs:

In my opinion the producing and refining capacity of the petroleum industry is adequate to meet foreseeable petroleum product demand, and arbitrary ceiling prices for individual products throw out of balance the proper relationship between supply and demand for such products. It is reasonable to expect that proper balance can be maintained by permitting the price for each product to seek its economic level. In view of the increased labor and material costs since the inception of price control, I anticipate an increase in crude prices to a level which will recover the current cost of finding and producing crude oil with eventually some advance reflected in refined product prices.

ALEXANDER FRASER,
President, Shell Oil Co., Inc.

Free Economy Allows Competitive Prices

Sirs:

The oil industry has for months been in position to fully meet all demands, and there has been no valid reason for price control. We expect that under a free economy fair prices will be set as before by competitive forces. There is no reason for the public to fear unreasonable increases, though it is probable that in due time oil prices will reflect the higher costs which have developed since Pearl Harbor.

B. B. JENNINGS,
President, Socony-Vacuum Oil Co., Inc.

Industry Cannot Ignore Changes in Its Costs

Sirs:

With OPA out of the picture, I see no reason for anticipating prices on petroleum products which vary significantly from what they would be had OPA been continued and carried out its avowed intention to decontrol. Changes in cost can be ignored no more by the petroleum industry than by any other, but the record of this industry over a period of many years in making continuously available to consumers ample supplies of constantly improved products at relatively low prices is so outstanding that in my opinion consumers may confidently expect future prices for the products of this keenly competitive industry which are fair and reasonable.

C. A. JOHNSON,
President, Holly Development Co., Los Angeles, and vice president for Southern California, Independent Petroleum Association of America.

Industry's Increased Costs Cited in Other Statements

Several other statements dealing with the effect of the termination of price control on the petroleum industry were issued during the week. Among them were comments on the situation by William R. Boyd, president of the American Petroleum Institute; an official of Standard Oil Co. (N. J.); and E. O. Thompson, member of the Texas Railroad Commission.

In an official A.P.I. release, Boyd said that the "past performance of the American petroleum industry in raising the quality and reducing the price of its products is the best assurance the public can have that those services will continue.

"The prices of petroleum products have always depended upon the costs of production and the ceaseless competition between oil companies rather than upon OPA edict," he declared. "Prices of gasoline and oil products have always been determined by costs, by free competition among hundreds of active and efficient oil companies. Like most typical American business, the oil industry is aggressive and competitive both as to product price and quality. This basic fact is not changed by the ending of OPA. . . . The petroleum industry, like other sound American industries, will do its best to hold the line on product prices. The industry believes that more production, more efficient distribution, and better products, hold the key to American prosperity.

"Under normal conditions costs vary and prices vary with costs. If we all work together, in due course not only can product prices be held but in many cases they can be reduced as full production and efficient operation are achieved by the effective cooperation of companies, employes, and the public."

Assurances that New Jersey Standard will not "take advantage of the situation by raising prices" were given by a company spokesman last week in New York. Until Congress makes a definite decision on price control, he said, "any move would just add to the general confusion."

Thompson predicted that the price of crude would increase from the present average of $1.20 a barrel to between $1.45 and $1.70 if OPA is permanently wiped out. The industry, he said, needs at least a 25 per cent increase in price in addition to the 10 per cent rise already granted. He cited increased wages and materials costs and the steadily mounting cost of wildcatting. Many authorities, he added, think that a 48 per cent increase in crude prices is necessary.

Mexican Union Protests Import of Texas Gas

MEXICO CITY.—The recently completed contract of Reynosa Pipe Line Co. under which it will export Texas gas to Monterrey, Mexico, last week was criticized by the Mexican Oil Workers Union.

In a letter to Mexican President Avila Camacho, the union protested that Petroleos Mexicanos, the government oil monopoly, "has spent more than 10,000,000 pesos ($2,000,000) looking for gas fields" but "permits an American company from Texas to sign a 10-year contract to supply Monterrey with gas."

The union has long fought the management of Petroleos Mexicanos, claiming "faulty management" is the cause of worker unrest and that contracts have been violated. In its letter, the union told the president that it will cease work stoppages in favor of "other means" of enforcing demands.

Hallanan Calls for Exemption of Oil in Price-Control Legislation

CITING "other fantastic reasoning" by Office of Price Administration officials, Walter S. Hallanan, president of Plymouth Oil Co. and temporary chairman of the National Petroleum Council, last week called for specific provisions to exempt the petroleum industry in any price control legislation.

Hallanan forwarded to Sen. Joseph C. O'Mahoney a copy of a letter written by Paul A. Porter, OPA administrator, to Sen. Joseph F. Guffey. Porter told Senator Guffey present demand was creating a pressure on the then-existing price ceilings of many petroleum products. In his letter to Senator O'Mahoney, Hallanan gave figures to refute Porter's arguments and to show that present stocks will meet all possible demand.

Copies of the correspondence follow:

July 5, 1946.

Hon. Joseph C. O'Mahoney,
United States Senate,
Washington, D. C.

Dear Senator O'Mahoney:

I have received from Sen. Joseph F. Guffey, a copy of a letter sent to him under date of June 27 by Mr. Paul A. Porter, administrator of the Office of Price Administration. Mr. Porter comments on a letter which I addressed to Senator Guffey along with other members of the Senate, with respect to the necessity and urgency of immediate action in looking to decontrol of the petroleum industry from wartime restrictions. A copy of Mr. Porter's letter is enclosed.

You will recall that during the latter part of June, Mr. Porter had indicated in other correspondence that there was some hesitancy upon the part of OPA to proceed with decontrol of the petroleum industry on account of the threatened maritime strike. That was the excuse then given by OPA for failure to take affirmative action. Since the maritime strike failed to materialize, it is obvious that OPA has found it necessary to resort to other fantastic reasoning in deferring action concerning the petroleum industry.

I send you a copy of the letter addressed to Senator Guffey because it indicates that OPA now is concerned with the consumption of gasoline—and fears for the necessity of continuance of control because of the increase in gasoline consumption. May I point out to you that even at the time this letter was written by Mr. Porter, gasoline stocks were 92,333,000 bbl. on June 29, 1946, as compared with 86,145,000 bbl. on June 30, 1945, an increase of 6,188,000 bbl. since last year. Gasoline stocks may decline to some extent during the coming weeks but we will still have maximum gasoline stocks to meet all possible requirements.

Gasoline stocks exceed 1941 levels and are at the highest point in 6 years. Present gasoline stocks are approximately 10,000,000 bbl. above the past 10-year average at this season of the year. Measured in days supply, present stocks are in line with normal requirements.

Year—	Total stocks of finished gasoline on June 30 (1,000 bbl.)	Total gasoline demand for following month (1,000 bbl. dly.)	No. days supply
1936	60,519	1,583	38
1937	67,839	1,743	39
1938	73,725	1,672	44
1939	74,395	1,751	42
1940	86,276	1,793	48
1941	82,411	2,113	39
1942	80,080	1,865	43
1943	67,345	1,828	37
1944	70,246	2,087	34
1945	74,089	2,351	32
1946	83,595	2,200*	38

*(Est.)

Principal petroleum products stocks for June 29, 1946, are nearly 22,000,000 bbl. above the stocks levels 1 year ago.

Product—	June 29, 1946	June 30, 1945	Increase
Gasoline (finished & unfin.)	92,333,000	86,145,000	6,188,000
Kerosene	13,881,000	9,571,000	4,310,000
Distillate	37,762,000	32,214,000	5,548,000
Residual	46,447,000	40,631,000	5,816,000
Total	190,423,000	168,561,000	21,862,000

While it is true that in some markets, housebrand gasoline has been selling at the ceiling price of 5¾ cents, it is also true that on ethyl gasoline the current market is 6¼ cents as compared with the OPA ceiling of 6¾ cents per gallon.

It has become more certain that OPA can always find some reason or excuse for refusal to decontrol the petroleum industry and permit a free economy to be restored. In consideration of any renewal of OPA authority, I think you should know that the petroleum industry would be helpless unless there was specific provision made for its exemption written explicitly and mandatorily into the law.

With assurances of high regard, I am

Sincerely yours,
WALTER S. HALLANAN.

June 27, 1946.

The Hon. Joseph F. Guffey,
United States Senate,
Washington, D. C.

Dear Senator Guffey:

This will acknowledge receipt of your letter of May 28, 1946, enclosing a letter of May 25 from Mr. Walter S. Hallanan, president of the Plymouth Oil Co., Pittsburgh, Pa.

We have had under consideration the possible suspension of petroleum price control, and have recently held several meetings with different petroleum industry advisory committees to ascertain from them the possible price trends in event of a suspension program. The reports from these committees state that crude oil could advance 25 cents per barrel and product prices approximately 1 cent per gallon.

We note Mr. Hallanan takes exception to my assertion that "immediate lifting of price control would cause industrial fuel oil to advance nearly 100 per cent over prices of this product in effect for 1941." There is a serious shortage of this petroleum product and it has been necessary for this office to increase the ceiling prices of residual fuel oil by approximately 25 per cent over the base period price in 1941 to bring out the necessary production. This shortage has been caused primarily by the large requirements of the Navy and War Shipping Administration who are currently using approximately 50 per cent of total residual fuel oil production. If price controls were lifted, a large increase in the price of residual fuel oil is very possible in face of the present short supply. The Refiners Industry Advisory Committee states there is an economically situated refining capacity in the United States of 4,900,000 bbl. per day. For the week ending May 25, 1946, refinery runs, according to the American Petroleum Institute report, amounted to 4,857,000 bbl. per day, or within 43,000 bbl. per day of maximum refining capacity. The large current demand for all types of petroleum and petroleum products has greatly surprised both government agencies and members of the industry. One industry advisory committee's report submitted early in May stated the probable daily demand would be between 4,400,000 and 4,500,000 bbl., while the actual demand as shown in the latest American Petroleum Institute report is running around 4,850,000 bbl. per day.

It may be true, as Mr. Hallanan states, that transportation facilities are adequate, ample manpower is available and competition may be strong within this industry; however, the present demand is so great it is creating a pressure upon the present ceilings of many petroleum products. Two to three months ago gasoline was in plentiful supply and was selling below ceilings at the wholesale level; however, today in most areas of the country gasoline is selling at present ceilings. Only in the Midwest area is this product being quoted at the wholesale level slightly below ceiling.

We are continuing to study the possibilities of suspending petroleum price control under the provisions of Directive 68 of the Office of Economic Stabilization.

Sincerely yours,
PAUL A. PORTER,
Administrator.

Panhandle to Acquire North Texas Leases

NEW YORK.—Panhandle Producing & Refining Co. will acquire two oil and gas leases in Texas through the transfer of 12,000 shares of common stock to Claude Neon Lights, Inc.

The two leases comprise 160 acres in Wichita County and 320 acres in Throckmorton County and are valued at approximately $144,000.

U. S. Sells New Mexico Carbon Black Plant

WASHINGTON.—War Assets Administration announced the sale of a partially completed carbon black plant at South Eunice, N. M., to Charles E. Johnson & Co. and Columbian Carbon Co. for $750,000.

The plant, 60 per cent completed, was intended for operation by the Johnson company to produce carbon black for the tire industry. When completed, it will require approximately 50 employes.

General Chemical Co., New York, N. Y., purchased the Front Royal, Va., sulfuric-acid plant which it operated during the war, for $1,386,000. Capacity of the plant is 160,000 tons of sulfuric acid per year. Production is used in the tire industry.

International

WORLD-WIDE OIL DEVELOPMENTS

Three Additional U. S. Offers Made For Venezuelan Royalty Oil

by Marian C. Cody

CARACAS, Venezuela.—The Venezuelan Government has received offers for the purchase of its royalty oil from three different interests in the United States in addition to that made recently by David D. Feldman, Dr. Perez Alfonso, minister of fomento, told The Oil and Gas Journal's representative here in a personal interview.

Dr. Alfonso said one of these United States companies had offered to pay 12 cents over the market price per barrel. No negotiations have actually been started as yet, he added, but Venezuelan Government representatives in Washington will soon begin contacts with these various companies.

The minister said he preferred not to mention the names of the companies until definite agreements had been made. He also said the Government had received offers for the purchase of part of the royalty oil from Argentina, Sweden, and Norway. Argentina has offered to exchange certain of her products badly needed in Venezuela, such as wheat and vegetable oil, for Venezuelan petroleum.

The Venezuelan Government is more interested in the disposal of its royalty oil from the standpoint of experience in the oil industry than it is in any monetary value that might be received, Dr. Alfonso stated. The Government also is interested in selling its royalty oil to markets outside the United States, thereby eliminating the 12½ cents per barrel duty charge.

The oil law of 1943 gives the Venezuelan Government the right to determine whether it chooses to take the total or partial payment of its 16⅔ per cent royalty oil in kind or in cash. (In some special instances the royalty is 33⅓ per cent). The law also provides that the Government is empowered to negotiate or sell its royalty oil, without previous legal formalities, through the office of the minister of fomento.

Up to the present time, the Government has always received its royalty oil payments in cash. The companies buy the royalty oil from the Government at the Gulf Coast price per barrel according to gravity, less a small charge for terminal handling to cover the cost of delivery of the oil from the producing field to the fiscalization plant. As the oil is purchased from the Government at the prevailing Gulf Coast price, the cost of transportation is assumed by the companies. In other words, the Government is paid the same price for its crude as the companies receive for it after transporting the oil from Venezuela to the Gulf Coast. The Government, however, does assume the 10½ cents per barrel charge for import duties on the crude.

Feldman's Offer

Two months ago, as announced in The Oil and Gas Journal at the time, negotiations were begun by Feldman, independent oil man of Dallas, Tex., with Dr. Alfonso for the purchase of 33⅓ per cent of the Government's tax oil. This proposition was given publicity in the Venezuelan newspapers to determine the people's reaction.

Feldman has offered to buy 33⅓ per cent of the Government's tax oil for a 2-year period from December 1, 1946, to November 30, 1948, approximately 20,000,000 bbl. yearly, at the same price that the operating companies here purchase the oil, and will pay the Government 50 per cent of all profits made from the resale of this oil. The contract states that profits shall be determined after the deduction of the purchase price of the oil from the Government, administration costs, Venezuelan taxes and transportation.

One of the stipulations of the contract is that for all or any part of the oil sold to any refinery in the United States in which the contractor has a financial interest, even though it may be indirectly, the contractor must guarantee a premium of 5 cents a barrel to the Venezuelan Government. For example, if oil was selling at the Gulf Coast price of $1.15 per barrel, Feldman would have to purchase this oil from the Government at $1.20 per barrel if the crude was sold to any refinery in which he had an interest. Twenty-five per cent of the oil sold by Feldman to United States refineries will be exempt from import duties.

The Government reserves the right, for 6 months after the start of the contract, to supply its royalty oil to companies operating here which, because of prior commitments, must have that oil to supply their customers and fulfill previous contracts. In this case, the amount of oil not delivered by the Government during the first 6 months would be given to the buyer later.

According to the contract, the buyer can determine the amount and type of oil he wants. The oil can be selected from any of the various producing areas in Venezuela. It is believed that he would prefer the Lake Maracaibo crude, as there is a particular market demand at the present time for fuel oils. He also has the right to decide at which Venezuelan ports he wants the consignments made, also the dates at which these consignments must be delivered, with the provision that he must make his requests for delivery of the oil in keeping with the respective legal obligations of the concessionaires, it being understood that the consignments are subject to fluctuations that occur in the delivery of oil from the various concessions. He will have to pay for transportation of the crude from field to port.

The Government and the contractor can increase or decrease the amount of oil to be sold by the Government at any time they so desire, upon mutual written agreement, without signing a new contract.

A contract has now been drawn up

and further negotiations with Feldman are now pending the approval of the contract by the Venezuelan Government. In late June the contract was turned over to the National Economy Council which will study and report on the project.

Dr. Alfonso made it clear that the Government wished, above all, to acquire experience in the oil business. After the first 2 years of the contract, he said, the Government would study the possibility of erecting a refinery which would be capable of handling all of the government royalty oil. The site of the refinery, he stated, may be at Turiamo Bay, where Creole Petroleum Corp., due to opposition by the Government, recently abandoned its project of refinery construction.

He stated also that there is no intention on the part of the Government to increase royalties. The sale of this royalty oil is in keeping with the provisions made by the oil law of 1943.

Output of Czechoslovakian Plant Used on Farms

WASHINGTON.—The output of the hydrogenation plant at Most, Czechoslovakia, is being used largely to cover agricultural fuel needs, according to the Foreign Commerce Weekly. By end of 1946 it is hoped that restoration work will be far enough advanced to permit the plant to cover 70 per cent of the country's requirements. The gas line from the plant to Prague is almost completed.

Under a recently signed reparations agreement, Hungary has undertaken to supply Czechoslovakia, within 6 years, with goods valued at $30,000,000, including $14,000,000 worth of crude and petroleum products.

Portugal's 1945 Imports Show Marked Upturn

WASHINGTON. — Imports of petroleum and products into Portugal, during 1945, amounted to 182,634 metric tons (about 1,278,438 bbl.), a marked recovery from the war years when imports fell as low as 42,776 tons (298,432 bbl.), in 1942, according to the Foreign Commerce Weekly. In 1944, petroleum imports totaled 109,625 metric tons (767,335 bbl.), and in 1940, 217,010 tons (1,519,070 bbl.).

The 1945 imports were classified as follows: Crude, 26,820 tons; gasoline, 44,089 tons; kerosene, 33,550 tons; lubricating oils, 6,322 tons; gas oil and fuel oils, 71,156 tons; and other oils, 697 tons. (A conversion figure of 7 bbl. to a ton is approximately correct.)

Vast Expansion Due in Peru's Montana Region

NEW YORK.—Within the next 10 to 15 years Peru's almost inaccessible Montana region—where only one company is now operating, with a very small output—is expected to be producing from 150,000 to 200,000 bbl. daily of crude oil. Moreover, as the picture looks now, the companies which take and develop concessions there will jointly finance a trans-Andian pipe line estimated to cost in the neighborhood of $35,000,000.

Plans, however, all hinge on the outcome of the recently completed new oil law which has been submitted to Congress. Congress convenes on July 28, but it is not expected that any action will be taken for at least several weeks later.

A. A. Curtice, petroleum engineer and geologist from the United States, was a government consultant and played a major role in drafting the new law.

The vast amount of capital and engineering "know how" which are marked for the Montana region—the area east of the Andes—will make this undertaking the greatest oil exploration effort in all history, according to sources familiar with both foreign oil development elsewhere in the world and with the problems which must be coped with in the Montana region.

The projected pipe line over the Andes will have to traverse heights of about 6,000 ft., which is higher than Colombia's Reiber pass, but still 4,000 ft. under the projected Bolivian pipe line over the Oriental Mountains for the transportation of crude from Bolivia's Camiri oil fields. The terminus of the Peruvian line presumably will be either Chiclayo or Paita, both on the Pacific.

No Plans for Refineries

The need for a proven reserve of approximately 300,000,000 bbl., in the Montana region, with a daily potential output of from 150,000 to 200,000 bbl. is seen before construction gets under way on the projected line.

Currently there seem to be no plans concerning refinery construction in the Montana region, but oil men foresee the time when Peru may be supplying off-shore markets now taken care of by California's declining production. Aside from California, Peru is the only oil-producing area on the west coast of the Americas, though reports from Ecuador indicate that at some time in the next few years Ecuadorian oil may also be a factor in such off-shore markets.

Currently, oil companies which do not have production in Peru, have representatives there looking over the prospects for concessions in the Montana region pending congressional approval of the new oil law. In fact, some geological parties are on the land, with the understanding that no obligations are entailed either by the Government or the companies themselves.

Aside from the Peruvian Government's own production, in the Zorritos and Los Organo fields, there are only three other companies engaged in crude production in Peru, and only one of these, Cia. de Petroleo Ganso Azul (Blue Goose), is in the Montana region. Ganso Azul's daily production, however, is a mere 269 bbl., but the daily potential is in excess of 5,000 bbl. Lack of adequate transportation is the reason for the relatively small output.

Cia. Peruana de Petroleo "El Oriente," a company backed by private Peruvian capital, is the only other company (operating under the old oil law) with a concession in the Montana, and this fall plans a wildcat test about 150 miles north of Ganso Azul's Agua Caliente concession. Aerial surveys and geological mapping indicate good prospects. This company shipped in a rotary via the Amazon River. Douglas Fyfe is operations manager.

The other two companies with Peruvian production are International Petroleum Co., Ltd., the largest and a subsidiary of Imperial Oil, Ltd., which in turn is owned by Standard Oil Co. (New Jersey) and Cia. Lobitos Petrolera, a British concern. International operates the highly-productive La Brea-Parinas Estate, and is now engaged in additional wildcat activities. The Lobitos property adjoins the La Brea-Parinas Estate. Peruvian Government operations are under the jurisdiction of Cuerpo de Ingenieros de Minas, Departamento de Petroleo.

The Peruvian Government also has a concession within the National Reserve area, in the Montana, and when materials are available, plans to run some tests.

Cuba's 1945 Light-Gravity Crude Production Gains

WASHINGTON. — Production of light gravity crude in the Jarahueca district of Cuba by numerous small companies in 1945 has been estimated at about 100,000 bbl. as compared with about 10,500 bbl. in 1944, according to the Foreign Commerce Weekly. On the other hand, natural gasoline production in the Motembo area declined from about 100,000 bbl. in 1944 to about 58,000 bbl. in 1945. Results of test drilling last year reportedly were more promising than in previous years.

This is a prewar view of the centuries-old oil field at Tseliutsin, the main district of the Chinese province of Scechuan. The wells are worked under incredibly primitive conditions. Pumps, for instance, are driven by manpower. (Photo by Three Lions)

Japan's Postwar Petroleum Needs Estimated At Less Than Half Those of Prewar

by Warren W. Burns

RUSSIAN crude production on the island of Sakhalin, a few hundred miles to the north, is, oddly enough, sufficient for the civilian requirements of all Korea, according to military authorities there who hope that eventually the much-disputed 38° parallel will be obliterated and that some degree of cooperation be obtained with the Russians. Prior to the war, crude production in North and South Sakhalin was approximately 12,000 bbl. daily, with the amount about equally divided in the two areas. Under terms of the Yalta agreement, Russia obtained South Sakhalin which, prior to the war, was controlled by the Japanese.

Concerning Sakhalin crude, United States military authorities have been unofficially approached by Russian interests wishing to sell Sakhalin crude in Japan.

Japan's postwar petroleum needs are estimated, by the military and the Petroleum Advisory Group stationed there, to be from 12,000 to 16,000 bbl. daily. This compares with about 40,000 bbl. daily before the war—a time during which huge amounts were consumed by industries engaged in turning out war material.

This is the second of a two-part discussion of oil developments in the Far East. The first part was published in last week's issue of the Journal.

In short the 40,000-bbl. daily figure did not represent normal requirements.

The Petroleum Advisory Group (PAG) is comprised of civilian oil men on loan to General MacArthur's staff, but they act solely in the interests of the occupying government, and are not directly concerned with their own company operations, although a certain degree of business communication is allowed by the military which continues to censor such correspondence. To date, PAG has been comprised of representatives of Caltex, Standard-Vacuum, Asiatic and Tide Water. However, Union of California shortly will add its representative to this group which will continue to operate in the months, and perhaps years, immediately ahead.

Meanwhile, General MacArthur is not allowing any private (oil or otherwise) representatives to operate in Japan—aside from those specifically delegated to work as his advisers. And while Japan eventually will be opened to foreign commercial enterprise, much emphasis should be placed on the word "eventually," according to reliable military officials who explain that "it may mean several years."

Within the next few weeks, drafts of the letters of intent between the military and five oil companies which will operate there (under military jurisdiction) are expected to be signed. The agreement will result in a type of operation in Japan similar to Posco in the Philippines. The five companies, as stated previously, will be Asiatic, Standard-Vacuum, Caltex, Tide Water, and Union of California.

The civilian Petroleum Advisory Group will continue to function, but solely in an advisory capacity. However, the five-company setup will handle commercial transactions on a cost-plus basis, but only for the military, and it is expected that the job these companies do in Japan will be more extensive than that being done in the Philippines.

The relationship among the five companies (which may operate under

some such name as Japanese Oil Storage Co.) briefly will be this: The military will import all petroleum products for military use and will retain ownership. The contractor (the five-company setup) will receive and store these products and will transport the products required to maintain prescribed levels in all U. S. Army depots and distribution points in Japan. Moreover, the contractor, as directed, will ship to points outside Japan and to Allied occupation forces.

The civilian and military oil requirements will split at the tanker and in no way will interfere with each other. That is, civilian oil requirements in Japan will continue to be distributed by the Japanese directed (but militarily controlled) Petroleum Distribution Coordinating Committee (known as PDCC). PDCC was a war-born oil group in Japan and it has been deemed expedient to continue its operations though greatly curtailed.

In prewar Japan, a unit known as Sekiyu Kyohan K.K. (Petroleum Joint Sales Co.) was formed and consisted of Japanese refining and importing companies. This company distributed oil according to strict government quotas. Moreover, until 1941, Standard-Vacuum, Asiatic, and Sekiyu Kyohan were authorized to sell and distribute petroleum products. When Asiatic and Standard-Vacuum were no longer allowed to operate in Japan and when Sekiyu Kyohan was dissolved in 1944 a Japanese Government-dominated agency, Petroleum Distribution Coordinating Committee was formed, and today PDCC is the sole distributor of petroleum products there—a situation, however, which is expected to be altered some time in the distant future.

In addition to the Japanese PDCC, there is also a board of trade known as "Boeki Cho" which is the sole Japanese agency dealing with imports and exports. Boeki Cho operates under Japan's ministry of commerce and industry.

The Japanese, anxious to raise their country's economy, are reportedly doing all in their power to convince the occupying forces that their oil needs are higher than the estimates being made by PAG. The Japs are also trying to convince high United States military, and at least one highly placed United States civilian, not to dismantle the majority of Nippon's refineries, but to rebuild and maintain these refineries as a "necessary" part of Japan's postwar economy. How successful such ambitious Japanese oil men will be remains to be seen.

Only recently a detailed inspection was made of the petroleum and synthetic refineries in Japan's nonproducing areas. Fifteen crude-oil refineries, 8 synthetic refineries, and 15 distribution plants were visited. As of March 31, 1946, it was determined that 329,700 bbl. of crude were available for refining. Of this amount, 72,000 bbl. were refined in this year's second quarter; while 170,000 bbl. are to be refined in the third quarter, and 87,000 bbl. in the fourth quarter. Total refinery losses in these periods are estimated to be 39,000 bbl., and the oil consumed as operating fuel, 57,000 bbl.

The trouble in recovering hidden Japanese military oil stocks has constituted quite a problem. However, a total of 425,000 bbl. was turned back last March and within the next 6 months an additional 280,000 bbl. are expected to be recovered. So far, these stocks have constituted part of Japan's current consumption. That is, the military has not claimed them.

The Japanese Government has been authorized to make the necessary refinery repairs to take care of available crude in the nonproducing areas, but no crude importations have been permitted. Meanwhile, the Japs hope that the refineries won't be dismantled.

Synthetic-Fuel Production

In 1944, Japan's peak year for refining liquid fuel from coal, only 718,000 bbl. of synthetic fuel was processed. Current plans call for the alteration of five of the seven synthetic fuel plants for the output of ammonium sulfate, using equipment originally designed for the production of aviation gasoline.

Well-informed sources state that Japan's indigenous production will never amount to much, with underground reserves estimated at only 12,000,000 bbl. In 1946, Japan's estimated indigenous production will be 1,400,000 bbl., or about 30 per cent of her needs. However, some military sources would like to see Japan's indigenous output pushed up to 2,100,000 bbl. this year, a goal which seems unlikely in view of the need for certain vital refinery repair equipment.

Meanwhile, civilian consumption in Japan is jumping fairly rapidly and although it is almost 10 months after V-J Day, Jap oil officials still don't have any reliable estimates as to the number of private vehicles in their country.

Japan's refining capacity in her producing areas remains about double the indigenous production. In fact, the only refinery in these areas to suffer any appreciable amount of war damage is the one at Akita and this is being repaired.

Looking forward to the day when companies, which possessed properties in Japan before the war, will be allowed to repossess them in their own names, General MacArthur has appointed a civilian property custodian who eventually will work out some method of solving foreign property ownership. Army officials intimate that future plans may provide for private owners to appoint their own custodians without taking possession in their own name—at least not until Japan is opened for commercial operations.

And until normal commercial operations are resumed, the 8 to 10-man civilian Petroleum Advisory Group is slated to continue functioning. Constantly, PAG is reviewing all phases of Japan's oil economy and once a month meets with Jap government officials, and various divisions of General MacArthur's headquarters staff, to determine the following month's requirements. From these requirements, production from the indigenous output is deducted, as well as varying amounts from captured military stocks.

The civilian members of PAG in Japan are not operating on the same basis as they did in Italy. That is, PAG members are not working for the oil companies which they normally represent, but rather for the supreme commander who has ruled that for the time no commercial representatives will be allowed in Japan for the purpose of postwar planning. The disrupted economy of the country is largely responsible for this, for the necessary food and living conditions are nonexistent, with the United States occupying forces generally providing all accommodations for the civilian personnel deemed necessary as government advisers.

Here is shown an operator adjusting a control valve in a prewar Japanese refinery

Reserves and Production of Natural Gas And Natural-Gas Liquids in Texas

*by Perry Olcott**

Texas leads the nation in gas reserves by a wide margin. Presented here are the first published figures on that state which classify natural gas by types of reservoirs, giving a history of discoveries and reserves, including reserves of natural gas liquids. This is a digest of material presented orally before the A.A.P.G. annual meeting.

THE natural-gas reserves and contained liquids in Texas have been divided into three categories: (1) Nonassociated gas or free gas not associated with oil in the reservoir; (2) associated gas which is gas overlying an oil reservoir as a gas cap; and (3) dissolved gas or the gas in solution in the oil in the reservoir which is released when the oil is produced. The nonassociated gas and the associated gas together make up what is generally called free gas, and the part of the associated gas produced with oil and the dissolved gas is called casinghead gas. These three categories were established because of the current conservation practices and the Railroad Commission regulations. All gas figures to be shown will be on a pressure base of 14.65 psia.

The nonassociated gas represents about 69 per cent of the total gas reserves. This is the gas produced from gas wells in Texas, and in general the only restriction is that the production must be marketed and the allowable cannot exceed 25 per cent of the open-flow potential. Allowables have been set in only a few fields to date. This nonassociated gas is the gas generally produced through cycling plants or into gas pipe lines for fuel.

The associated gas, representing about 22 per cent of the total gas reserve, is restricted to cycling operations and the quantities produced with oil as casinghead gas. On October 20, 1944, the Texas Railroad Commission changed its Rule 6 to read that the amount of gas which could be produced from a gas well in a gas cap is limited to a volumetric displacement of oil and gas equivalent to a 2,000:1 ratio on the highest oil allowable. Under this ruling, the oil allowables of high-ratio wells are penalized, and the only way a gas cap can be utilized is to cycle the gas and strip the heavier hydrocarbons. For this reason, it is necessary to separate the free gas reserves into the part available for market and the part which can be cycled only.

Dissolved Gas Designation

The dissolved gas designation is the same as has been used for years and represents the gas liberated from solution in the oil as it is produced. This is the remaining 9 per cent of the gas and is generally produced through natural-gasoline plants when the vol-

*Humble Oil & Refining Co., Houston.

TABLE 1—NATURAL-GAS CUMULATIVE DISCOVERIES, PRODUCTION, AND YEAR-END RESERVES AT 5-YEAR INTERVALS, 1900-1945, INCLUSIVE (IN TEXAS)
(In millions of cubic feet)

Prior to	Cumulative discoveries				Production		Est. year-end reserve
	Nonassociated	Associated	Dissolved	Total	Yearly	Cumulative	
1901	.....	.....	5,462	5,462	650	650	4,812
1905	.....	37,500	152,642	190,142	11,000	32,263	157,879
1910	200	37,500	158,201	195,901	8,000	69,163	126,738
1915	19,834	89,475	603,833	713,142	30,334	169,054	544,088
1920	30,962,510	432,675	1,055,125	32,450,310	80,019	416,080	32,034,230
1925	32,080,432	1,056,634	1,884,434	35,021,500	418,964	1,796,157	33,225,343
1930	32,974,393	2,612,177	5,850,947	41,437,517	967,880	5,611,280	35,826,237
1935	40,088,266	12,622,674	8,339,179	61,050,119	1,218,085	10,754,444	50,295,675
1940	60,800,446	18,525,529	11,114,939	90,530,914	1,523,650	17,470,863	73,060,051
1945	68,045,936	21,626,944	12,904,662	102,577,542	2,607,177	27,481,714	75,095,828

TABLE 2—NATURAL-GAS DISCOVERIES BY DISTRICTS (IN TEXAS)
(In millions of cubic feet)

	Nonassociated		Associated		Dissolved		Total	
	Total discovered	Per acre	Total discovered	Per acre	Total discovered	Per acre	State	Per acre
Gulf Coast	11,874,654	65.0	9,035,418	54.3	2,390,386	12.4	24,200,458	60.3
Per cent district	49.07		41.05		9.88		100.00	
Per cent state	17.45		45.94		18.52		23.59	
East Texas	7,424,780	21.9	1,791,442	24.1	2,432,084	10.3	11,648,306	20.0
Per cent district	63.74		15.38		20.88		100.00	
Per cent state	10.91		8.28		18.85		11.36	
Southwest	11,841,109	36.8	5,590,502	32.8	1,677,934	5.6	19,109,545	29.9
Per cent district	61.96		29.26		8.78		100.00	
Per cent state	17.40		25.85		13.00		18.63	
West Texas	158,075	4.2	3,040,076	18.1	3,747,476	5.7	6,945,627	9.8
Per cent district	2.28		43.77		53.95		100.00	
Per cent state	.24		14.06		29.04		6.77	
North Texas	36,747,318	16.3	1,269,506	6.4	2,656,782	5.2	40,673,606	14.6
Per cent district	90.34		3.13		6.53		100.00	
Per cent state	54.00		5.87		20.59		39.65	
Texas	68,045,936	21.7	21,626,944	27.3	12,904,662	6.8	102,577,542	20.0
Per cent state	66.34		21.08		12.58		100.00	

TABLE 3—STATUS OF NATURAL-GAS RESERVES AS OF JANUARY 1, 1946, BY DISTRICTS (IN TEXAS)

	Nonassociated gas		Associated gas		Dissolved gas		Total		Avg. res. per surf. acre, M.M.c.f.
	Productive acres	M.M.c.f. reserve	Productive acres	M.M.c.f. reserve	Productive acres	M.M.c.f. reserve	Surface acres	M M.c.f. reserve	
Gulf Coast	182,602	11,320,209	182,681	8,807,120	193,174	1,435,925	401,051	21,563,254	53.7
Per cent district	....	52.50	....	40.84	....	6.66	....	100.00	
Per cent state	5.82	21.90	23.05	53.33	10.19	20.81	7.84	28.71	
East Texas	338,685	6,683,124	74,055	1,111,444	235,630	1,336,080	581,721	9,130,648	15.7
Per cent district	....	73.20	....	12.17	....	14.63	....	100.00	
Per cent state	10.80	12.93	9.35	6.73	12.43	19.37	11.36	12.16	
Southwest Texas	321,877	10,000,807	170,550	3,933,953	300,215	1,035,731	639,147	14,970,491	23.4
Per cent district	....	66.80	....	26.28	....	6.92	....	100.00	
Per cent state	10.26	19.35	21.52	23.82	15.83	15.01	12.49	19.94	
West Texas	37,690	132,715	167,690	2,262,207	656,250	2,459,556	710,709	4,854,478	6.8
Per cent district	....	2.73	....	46.60	....	50.67	....	100.00	
Per cent state	1.20	.26	21.16	13.70	34.60	35.64	13.88	6.46	
North Texas	2,255,500	23,543,267	197,500	400,500	510,980	633,190	2,786,230	24,576,957	8.8
Per cent district	....	95.79	....	1.63	....	2.58	....	100.00	
Per cent state	71.92	45.56	24.92	2.42	26.95	9.17	54.43	32.73	
Texas	3,136,354	51,680,122	792,476	16,515,224	1,896,249	6,900,482	5,118,858	75,095,828	14.7
Per cent state	....	68.82	....	21.99	....	9.19	....	100.00	
1945 Pdn.	....	1,803,465	....	692,200	....	425,264	....	2,920,929	
Per cent state	....	61.74	....	23.70	....	14.65	....	100.00	
Ratio Pdn. to reserve	....	28.66	....	23.86	....	16.23	....	25.71	

TABLE 4—STATUS OF NATURAL-GAS LIQUIDS RESERVES AS OF JANUARY 1, 1946, BY DISTRICTS (IN TEXAS)

	Thousands of barrels								Avg. yield per M.M.c.f. bbl.
	Nonassoc. reserve		Associated reserve		Dissolved reserve		Total reserve		
	Total	Per acre	Total	Per acre	Total	Per acre	Total	Per acre	
Gulf Coast	238,647	1.307	183,632	1.005	35,622	.184	457,901	1.142	21.2
Per cent district	52.12		40.10		7.78		100.00		
Per cent state	30.58		58.39		8.73		30.47		
East Texas	107,460	.317	24,363	.329	205,583	.872	337,406	.580	37.0
Per cent district	31.85		7.22		60.93		100.00		
Per cent state	13.77		7.75		50.40		22.45		
Southwest Texas	139,562	.434	43,772	.257	24,861	.083	208,195	.336	13.9
Per cent district	67.03		21.03		11.94		100.00		
Per cent state	17.88		13.92		6.10		13.86		
West Texas	433	.011	50,778	.303	107,250	.163	158,461	.223	32.6
Per cent district	.27		32.05		67.68		100.00		
Per cent state	.06		16.15		26.30		10.54		
North Texas	294,292	.130	11,925	.060	34,545	.068	340,762	.122	13.9
Per cent district	86.36		3.50		10.14		100.00		
Per cent state	37.71		3.79		8.47		22.68		
Texas	780,394	.249	314,470	.397	407,861	.215	1,502,725	.294	20.0
Per cent state	51.93		20.93		27.14		100.00		
1945 production	33,326		10,282		17,952		61,560		
Per cent state	54.14		16.70		29.16		100.00		
Ratio Pdn. to reserve	23.42		30.58		22.72		24.41		
Per cent total oil pdn.	4.43		1.37		2.39		8.19		

ume and yields are sufficient to warrant the construction of a plant. In fields where there are no plants, the dissolved gas is either used for fuel, compressed and put into gas pipe lines, used for repressuring or gas lift, or flared. It should be kept in mind that there is no material physical difference between these three gases. The distinctions are solely on the basis of their position in the reservoir as related to oil and whether in a single-phase or two-phase reservoir.

The history of the gas discoveries in Texas has been one of ever-increasing volume. The accompanying tables show these discoveries and the relationship between the three categories. In these tables the total reserves of each field are credited to the year in which the field was discovered.

New Mexico Allowable Set

HOBBS, N. M.—New Mexico's daily allocation of 106,000 bbl. in July, set by the Oil Conservation Commission, exceeded last week's estimated daily average production of 98,150 bbl., by 7,850 bbl. The Bureau of Mine's July estimate of demand for New Mexico oil was 97,000 bbl. The July figure represents a top per-well allowable of 41 bbl. a day.

Crude Stocks Increase

Crude stocks for the week ending June 29 totaled 223,883,000 bbl. according to the Bureau of Mines report, an increase of 1,690,000 bbl. compared to the previous week. One year previous, stocks were 220,781,000 bbl. These data were received too late for inclusion in "Statistics and Trends" on page 130.

Canadian Gasoline Demand Expected to Exceed 1945

TORONTO.—Canadian postwar consumption of motor gasoline has exceeded all previous estimates, and refineries are running at full capacity to meet the demand, which will exceed that of 1945, W. K. Whiteford, president, British American Oil Co., told stockholders this week.

British American's program of expansion for refineries and service stations, he said, has been curtailed by the continued shortage of materials.

WASHINGTON WATCHING

BY HENRY D. RALPH

Price Control Outlook

WASHINGTON.—The new price control bill which the Senate started wrestling with this week would affect the petroleum industry in almost exactly the same way as the bill President Truman vetoed, that is, if honestly administered it would require substantial increases in oil price ceilings if not complete and rapid decontrol.

The decontrol and stripper well subsidy provisions are identical, and the repricing provisions are not materially different as regards petroleum. However, they do give the price administrator considerable discretion, and it is this feature which is causing the greatest controversy.

The changes were made in the so-called Taft and Wherry amendments, both of which were severely criticized in the President's veto message. The Taft amendment required price ceilings to cover October 1941 prices plus all subsequent increases in producers' unit costs. As revised by the Senate committee on banking and currency, the repricing provision would use 1940 as base, a proposal acceptable to Senator Taft and other critics of price control. Since petroleum prices changed very little between 1940 and 1941, this change would make very little difference to the oil industry.

Basis of Increases

However, the increases are to be based on industry averages, and the language gives OPA considerable leeway. The committee's provision states that a price ceiling must "return on the average to the industry not less than the average dollar price during the base period, plus the average increase in cost of producing, manufacturing, or processing the same accruing since the base period, but the maximum prices for a product shall be deemed in compliance with this standard if such prices on the average are equal to the average current total cost of the product plus the industry's average over-all profit margin on sales in the base period."

The administrator is directed to base his cost and profit findings on those of a reasonable number of typical producers, manufacturers, or processors, and to follow accepted methods of accounting "and such fair and reasonable methods of calculation as he shall establish by regulation."

Thus OPA might make almost anything it wanted out of the new bill, just as it did out of the expired law. Its regulations on accounting practices could lead to interminable argument and delay.

Other provisions are that a ceiling need not return costs to any particular producer, increases need not be given if they would not result in an increase of needed production, and increases could be denied if increased production would hamper the output of equally needed articles.

Comparable changes were made in the Wherry amendment, originally written to require that price ceilings for distributors cover their acquisition costs plus their January 1, 1946, mark-ups. The revised bill directs OPA to make "due allowance" for current acquisition costs plus mark-ups existing on June 29, 1946.

OPA Stalling Forbidden

IN rewriting the OPA bill the Senate committee made no changes whatever in the decontrol provisions, a fact which OPA supporters are criticizing bitterly even though the President's veto message appeared to accept the decontrol machinery.

Should the pending measure become law it should result in the early elimination of all price ceilings on petroleum—if administered as intended by Congress. It states flatly: "The administrator shall provide for prompt removal of maximum prices in the case of any nonagricultural commodity whenever the supply thereof exceeds or is in approximate balance with the demand therefor (including appropriate inventory requirements)."

An industry advisory committee may petition for decontrol, and OPA must give an answer within 15 days. If the action is not satisfactory the committee may petition the new price decontrol board, which has power to order OPA to drop price ceilings.

This language would seem adequate to force complete decontrol of the oil industry, since all statistics indicate that petroleum products are in approximate balance with demand —except for the fact that in the past OPA officials have said that this has been their policy all along, and yet price ceilings have stayed on oil. However, the new bill would prevent OPA from stalling forever, and it can be taken for granted that the oil industry advisory committees would file decontrol petitions at once and keep pressing for immediate action.

No Hurry-Up Law Likely

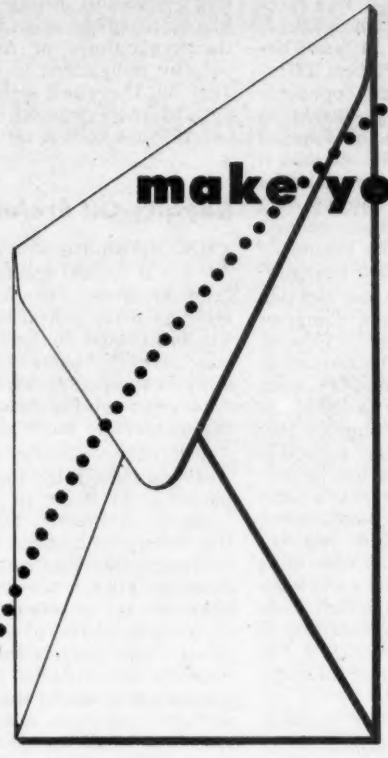
DESPITE the fact that the new OPA bill which the Senate took up Monday differs in only a few respects from the measure vetoed by the President, it signaled a repetition of the entire battle over price control in general, and every day of debate increased the possibility that there might be no law at all.

The Senate bill is technically an amendment to a stop-gap measure which the House rushed through on July 1 to extend the old law unchanged for 20 days. The idea behind this was that it would be unthinkable for the nation to survive even a few days without price control and that in the 20-day period Congress could write a more permanent extension. When the bill reached the Senate, obstructionist tactics made it clear that it would take as long to get through a temporary extension as a 1-year renewal.

Meanwhile, the nation experienced a week of "free markets" during which the calamity predicted by OPA officials failed to materialize. Some prices went up, particularly where subsidies were terminated, but the prices of most staple commodities failed to show any signs of a wild inflationary spiral. The price control supporters, of course, argued that businessmen were afraid of what would happen when a new law becomes effective and prices are rolled back to their June 30 levels, but more and more members of Congress began to voice the view that if we can get along nicely for a couple of weeks without rigid price controls perhaps we could dispense with them permanently right now.

Fly in Ointment

In his veto message President Truman said the bill sent him June 28 was worse than no price control at all, and the feeling was growing that Congress might as well give the President the lesser of the two evils and do away with OPA. The chief fly in this ointment is rent control. There is a general feeling that the federal Government should control rents for another year or so in the absence of local control, and Republican members of Congress made several attempts to put through a simple resolution continuing rent control while further study is given to price control extension. These moves were blocked by the administration in the well-justified belief that if rent control



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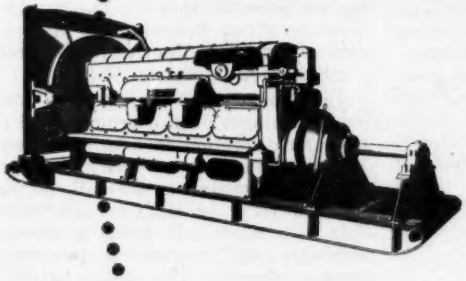

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were taken care of, Congress would never pass another price control law.

As things now stand there is an even chance that the new bill will never become law and that control of both rents and prices will be abandoned. At any rate the measure faced delay in the Senate and then it will have to go back to the House for action on the Senate's substitute to the 20-day extender.

Ex-Post-Facto Law?

IF the new OPA bill does become law, the theory is that OPA will pick up exactly where it left off on June 30. All price orders and regulations then in existence are to be reinstated. Some members of Congress have raised the legal question whether such a retroactive law would be constitutional, but most of them have been content with the knowledge that it is not an "ex-post-facto" law since it provides that no prosecutions be brought for violations between June 30 and the effective date of the new act.

In addition to restoring all price ceilings, the bill reinstates all proceedings pending in OPA. Thus the long-pending applications for increases in ceiling prices of crude petroleum and refined products would be just where they have been for many months—not dead but sleeping.

The bill gives the administrator 30 days after enactment before putting into effect any of the changes made in the law. Thus, while he is told to decontrol many commodities promptly and to act on decontrol petitions within 15 days, he can maintain June price ceilings for a full month before doing anything at all. It is generally expected that petroleum prices will remain stable while Congress is debating the new bill, so if the bill should become law the middle of July, OPA could stall off action on oil prices until September at the very earliest if it is determined to continue the delaying tactics it has been following since the end of the war.

OPA Employes Hopeful

THE Office of Price Administration is not dead, even though the law creating it has expired and no funds are currently available for its use. By an executive order President Truman continued the agency in existence to administer sugar rationing (authorized under a different law) and to continue prosecution of violations occurring prior to June 30. OPA employes report at their offices every day and hope that Congress will restore their jobs and appropriate money for their salaries.

Chester Bowles has resigned as director of economic stabilization, citing as one reason the fact that Congress apparently didn't trust him. In a farewell radio address to the nation, Bowles said: "Just about 24 hours before I resigned, Senator Robert Taft—one of the most persistent opponents of effective price controls—made an interesting statement on the floor of the Senate. He told the Senate that if I were out of the picture he would be in favor of continuing the existing price control laws without any change. Senator Taft now has the chance to show that he meant what he said."

Whatever Senator Taft's reaction may be, most members of Congress were not impressed much by Bowles' departure from the administration. Those who, like the oil industry, have battled unsuccessfully with OPA for months and years are convinced that Bowles' philosophy of delaying action and searching for excuses has permeated deeply through the entire OPA staff. They fear that the maintenance of inflexible price controls has become a fetish and that the remaining OPA employes would not accept the new law in the spirit in which Congress wrote it but would continue to seize upon every discretionary power as a device to postpone price increases and price decontrol.

Incidentally, on the last business day of its life OPA did suspend price control on 22 petroleum products—all of them specialties of relatively minor importance. This is of academic interest at the moment, but if the price control act should be reenacted this suspension order would take effect. The list of suspended controls covers such items as household packages of lubricants, insecticides, floor polish and spot removers; shock absorber fluid; and additives for lubricants.

Stripper Subsidy Provided

THE stripper well subsidy will be continued for several months if the revised OPA bill becomes law. The bill provides that all OPA subsidy programs are to be progessively reduced and terminated not later than April 1, 1947, but adds: "Provided, that subsidies with respect to petroleum produced from stripper wells shall be continued at not to exceed the present rates."

When other commodities are decontrolled their subsidies are to stop, but this does not apply to petroleum, so the stripper well program is definitely cut loose from price control. This puts it in a separate status favorable to continuation as a permanent policy should Congress so desire. It would, of course, require new legislation to continue the program beyond next March.

The bill provides for the reinstatement of all OPA regulations and orders in effect on June 30, just as though the law had not expired, except that no one is to be prosecuted for a violation during the period of hiatus. Another provision authorizes the expenditure of funds to fulfill subsidy obligations incurred prior to June 30. Therefore, stripper well subsidy payments should continue without a break if this bill becomes law.

Royalty Oil Preference

CONGRESS has completed action on a bill (S.680) to give small refineries preference in purchasing government royalty oil from public lands. The bill passed the Senate last March, was recently passed by the House with amendments, and the Senate has now accepted the changes and sent the measure to the White House.

The changes made by the House were requested by the Interior Department in order to make the bill easier to administer. The bill provides that when the Secretary of the Interior determines that sufficient supplies of crude oil are not available in the open market to refineries not having their own source of supply he may grant them preference in the purchase of government royalty oil for processing or use in the refineries and not for resale as crude. Such sales may not be at less than the current market price for that oil. The department is given discretion to prorate such oil among refineries in the area of production.

The department objected to the Senate version on the ground that it gave no discretion in administration. It asked for the provisions, which were incorporated in the bill, giving the secretary the right to determine that sufficient crude is not otherwise available and permitting proration among refineries, the reason being a fear that several refineries might ask preference for the same oil. The department also asked for discretion to require competitive bidding for such sales of royalty oil.

Rubber Plant Disposal

DELAY of another 6 months or more in offering for sale a substantial portion of the Government's synthetic-rubber industry has been recommended by the Senate military affairs committee in a resolution which seems likely to be adopted shortly.

The War Assets Administration had recommended immediate sale of the butyl rubber, petroleum butadiene, and most of the other plants constructed during the war, but the committee's resolution provides for withholding action until 6 months after Congress receives further reports on long-range policy from the Inter-Agency Policy Committee on Rubber and from the Office of War Mobilization and Reconversion.

Markets Continue to Mark Time As Price Confusion Prevails

by Dahl M. Duff

PETROLEUM markets continued to mark time this week amid widespread speculation over when and in what form price increases beyond the now-defunct ceilings may occur.

There appeared to be little inclination to push products prices above what were the legal limits prior to July 1. Most gasoline was moving under contract at ceiling levels; spot sales were limited and either at ceiling or fractionally under.

The single petroleum product to show a higher price during the week was natural gasoline which climbed upward ¼ cent in the Mid-Continent area. The increase was regarded as a natural market response to the current heavy gasoline demand.

On the Group 3 basis, natural gasoline was quoted at 3.5 cents for the 26-70 grade. North Texas price for the same grade was 3 cents. Natural gasoline quotations tumbled in midwinter to 2¾ cents, Group 3, and 2¼ cents, North Texas, at a time when much motor fuel was going into storage.

Market observers pointed out that it is economically advantageous for refiners to use maximum amounts of natural gasoline for blending under present price levels. In addition, because of the lead shortage, many refiners are using increased amounts of natural to increase lead susceptibility.

Mid-Continent Offerings Scarce

Products buyers in the Mid-Continent area generally reported that offerings are scarce. Suppliers were said to be little interested in spot-sale inquiries. Refiners were reported to be storing as much material as possible, still waiting for the turn of developments in Washington.

Market discussion centered on the likely outcome of the current fight in Washington to reinstate price control, the effect of any belated legislation on petroleum, and the probable price trend in the event no extension law is passed.

With pressure from independent producers, particularly small-well operators who have lost the federal subsidy, some market observers were of the opinion crude will lead the price-increase movement after it becomes clear no new law will be voted, or petroleum will be exempt. Sentiment for an early crude increase has found support even from crude buyers.

Products prices are expected to move upward as a result of higher crude costs. Influencing these predictions are the usual seasonal trends. Demand for gasoline is due to slacken with the end of the summer traveling season, while burning-oil requirements increase.

Aside from the price control situation, demand for residual fuel oil was again reported as easing. Several weeks ago, most spot-market material was moving at $1.18 per barrel—the ceiling—but a 5,000-car sale for late July shipment at $1.05 per barrel was reported in the Mid-Continent area last week. Refiners are receiving $1.05 for residual sold under contract to railroads. In the New York area, residual also was reported easing with little activity in the product.

New York Gasoline Prices Up

Gasoline prices in the New York area were about up to the former ceiling. One informant said that if demand continues to mount there may be some difficulty meeting supply and at the same time maintaining safe working stock levels. Motor car registrations, which increased 250,000 in New York last year, are largely credited for the unanticipated demand.

From California came reports marketers there also are closely watching Washington developments. Heavy production and competitive selling was described as preventing price changes at the present time. The loss of the stripper-well subsidy was a blow to many operators. It was reported a drop of 35 cents a barrel at Kern River will mean the difference between profit and loss and may force suspension of some production. In this field much water is produced, the crude is low in gravity, and most of the operators are independents.

Though residual appeared to be easing in the Mid-Continent and New York areas, it was still tight on the Gulf Coast where the Navy and War Shipping Administration are still taking heavy deliveries. The Gulf Coast gasoline market was much the same as elsewhere with suppliers unwilling to commit themselves at current prices for forward delivery because of the unsettled price-control picture.

DEATHS

Delbert Leggett, 61, assistant to the head of the land department, Stanolind Oil & Gas Co., died July 5 at his home in Fort Worth, Tex.

John Houck, 70, retired Pennsylvania rig builder, died July 1 at his home in Duke Center, Pa.

Walter Holzen, 50, died July 5 at his home in Wilson, Okla. Holzen had been associated with Lincoln & Moore, drilling contractors.

E. H. Cunningham Craig, British geologist who was active in early Alberta oil development, died recently in England. Since 1907 he had been an independent consultant, visiting practically all the world's oil fields.

Henry W. Burns, 60, associated with Shell Oil Co., Inc., died July 1 at his home in Houston.

J. F. Hutchins, 62, well-known independent South Texas operator, died July 3 in Houston. He was part owner and retired president and general manager of the 100,000-acre Pierce ranch in Wharton, Matagorda, and Brazoria counties, on which are located four oil fields, the first of which was discovered in 1934.

Louis Titus, 74, former president of Texas Conservative Oil Co. of Corpus Christi, Tex., died July 2 in Corpus Christi.

Joseph L. Cox, 60, operator of J. L. Cox & Son, pipe-line stringing company, died July 4 at his home in Raytown, Mo.

Clifford R. Ross, 40, drilling contractor and president of C. R. Ross & Associates Drilling Corp., Mount Vernon, Ill., died July 4 at Wewoka, Okla. He had been active in Seminole County, Oklahoma, oil development and had drilled wells in the Sasakwa field and the North Sylvan area.

A. P. McBride, 84, active in early-day oil and gas development in Oklahoma, Kansas, and Texas, died July 3 at his home in Independence, Kans. He drilled the first gas well at Coffeyville in 1892, and with T. N. Barnsdall, Pittsburgh, he formed Wichita National Gas Co. in 1905. At one time, he was president of Associated Oil Co. which he helped organize.

Samuel I. Ford, 78, recently retired as northern division superintendent of the Mid-Continent Pipe Line Co., died July 8 at Tulsa, Okla. Ford started his oil career in Pennsylvania and came to Oklahoma about the time of statehood, where he was associated with Prairie Oil & Gas Co. and later with Oklahoma Refining & Producing Co.

Operational Procedure for the AIRBORNE MAGNETOMETER

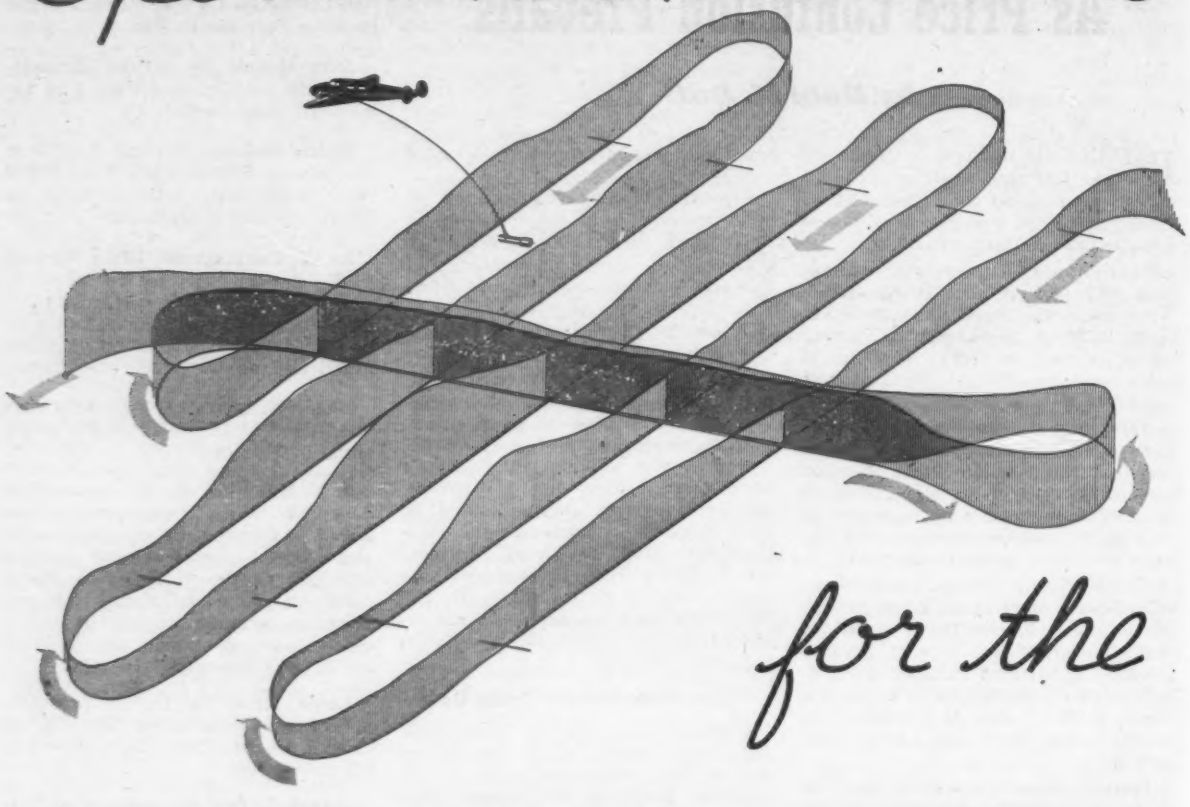


Fig. 1—Schematic diagram of magnetic survey flight, showing relation of profile and base lines. Height of curve represents indicated magnetic intensity.

by Homer Jensen

THE continuity of records from the airborne magnetometer, and the speed with which data are registered, permit the use of new methods of control which raise the efficiency of the airborne surveys to a high level. This article will discuss the procedures which have been worked out in the surveys conducted jointly by the Naval Ordnance Laboratory and the U. S. Geological Survey, during the past 2½ years.

The basic concept of the survey is raised from a "point" or a "station," to a "line." Records are made continuously, resulting in profiles whose values are known at every point; and they are made so rapidly that any particular profile needs only minor corrections for diurnal variation and instrument drift. Nevertheless, rigid magnetic control is required to permit the making of accurate contour maps. It is believed that the methods which have been developed do provide such rigid control.

Flight control is as important as the magnetic control, and it, too, imposed problems which have now been worked out successfully. In general, there are two types of flight control: visual, which is employed where adequate maps or photographs of the terrain are available, and radar control, which is employed over unmapped areas, or over open water or other undifferentiated surfaces. Both methods have been employed extensively in surveys in the United States and Alaska, and over the Gulf of Mexico.

In visually controlled flights, a navigator sits in the nose of the ship, or next to the pilot, and reads his map or photographs as the plane flies over the terrain represented. He gives course corrections to the pilot, marks notations on his maps, and has general control of the operations. At intervals, over recognizable landmarks, he presses a hand switch, to operate a serial number counter which registers on all the records being made, and provides a key to their correlation. As a check against loss of part of the records, he notes the serial number on the point on his map corresponding to the time of advancing the number.

The magnetometer operator keeps the instrument in proper operation,

The author, now chief of the Magnetometer Division, Aero Service Corp., Philadelphia, was with the Naval Ordnance Laboratory during the war, and was NOL representative on all the airborne-magnetometer mineral surveys that have been made to date. He was in general charge of both the airborne-magnetometer installations, and the design of special equipment. He is an authority on practical operational procedures with this new instrument.

The airborne magnetometer, of all wartime developments, has aroused most interest in the oil industry because of its potentialities in reducing the cost of geophysical reconnaissance work. In the June 8 issue, The Oil and Gas Journal published the first authoritative article on the history and development of this instrument and its potential uses by Dr. E. A. Eckhardt, vice president of Gulf Research & Development Co., under whose supervision the instrument was developed just before the war.

The present article, dealing with operational procedures, by an outstanding authority on that phase of the subject, supplements the previous article, which was limited by military restrictions then in effect, but since released. Readers will also note reference in this article to Shoran Radar as a necessary auxiliary to the airborne magnetometer in certain areas. They will find a description of Shoran Radar and its workings in the July 6 issue of The Oil and Gas Journal.

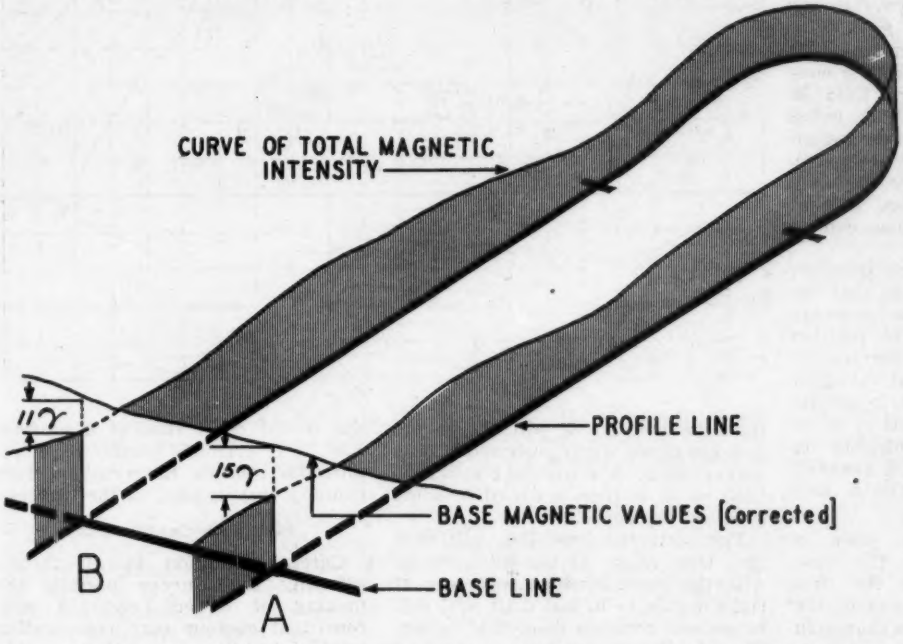


Fig. 2—Section of flight scheme, showing effects of drift between crossings of base line.

and from time to time notes the serial number on his own records. He also tends to the camera, the radio altimeter, and other associated devices.

Correlation with the ground is provided by a Sonne "strip camera," which records an unbroken continuous picture of the ground, for distances of about 800 miles on a single film. The camera is gyro-stabilized, to improve its image quality and the accuracy of its registry of the plumb-line from the plane. It is possible, using this camera, to retrace a flight at 1,000 ft. altitude with an error never exceeding 25 ft. The key serial number is photographed on the film strip by means of a supplementary camera attached to the side of the strip camera, thus securing instantaneous correlation of all airplane records with ground position, at any desired time intervals.

Where visual control is not practical, the Shoran radar is employed to give control of flight path, and an accurate record of it. Auxiliary devices for Shoran have been worked out which permit a final record in which the coordinate of distance from one station is registered continuously, and the distance from the other marked at every even mile. The system employed results in a flight control of sufficient accuracy for any contemplated magnetic surveys.

In either type of flight control, altitude is controlled by both radio and aneroid altimeters. Decision as to the altitude to be flown must be made on the basis of conditions of a specific survey. A basic altitude of 1,000 ft. has been found satisfactory in most oil surveys, but since it limits over-water Shoran range to about 40 miles, it may be that a large portion of future surveys will be made at a greater altitude. Over land, it has been the practice to follow the general slope of the land, so that if a coastal area slants gently up, the flight level will also slant to keep a constant average height above land.

The APN-1 radio altimeter has been successfully modified by R.C.A. to provide a recorded output, so actual height above terrain can be determined within close limits over the whole run of a survey. The vertical gradients of total intensity encountered in oil surveys are usually so small that an error in flight level of 50 to 100 ft. will not cause a noticeable error in magnetic readings.

The following discussion of a sample survey will illustrate many of the aspects of magnetic surveying in general. Fig. 1 diagrams such a simplified survey. Flight lines are mapped out in parallel lines at the desired profile interval (usually 1 mile in oil surveys), and a flight plan is made which will give the most efficient utilization of total flight time. The sample diagramed here is over simplified and has fewer and shorter lines than would be the case in any probable survey.

The actual profile lines are the straight sections of the grid; the flight lines are shown extending beyond, to allow for turns and maneuvers. Though the magnetometer is operated continuously, only data made during the straight sections are utilized. On the diagram, the height of the curve represents the value of total magnetic intensity, above an arbitrary base value.

The airplane, in this sample survey, enters the pattern in the upper right-hand corner, and flies as indicated by the arrows. After completing the grid of parallel profile lines, it flies half a line, and then enters a line which crosses all the profile lines at approximately right angles. At the end of this line, it turns around, reflies the intersecting line, and leaves the survey area.

Error Corrections

The intersecting line is the "base line," aerial surveying's equivalent of the "control station," and it becomes the key to the correction for all the errors which enter the data. Some point on the base line is given an arbitrary base value, to which all other magnetic values in the survey are related, but no attempt is made to establish a "control point." The base line is the smallest unit of control. By repeating it in an opposite direction, and averaging the values

learned, its relative values are established to the degree of accuracy permitted by the instrument. In a good survey, the base line should be repeatable to a gamma or so over its entire length.

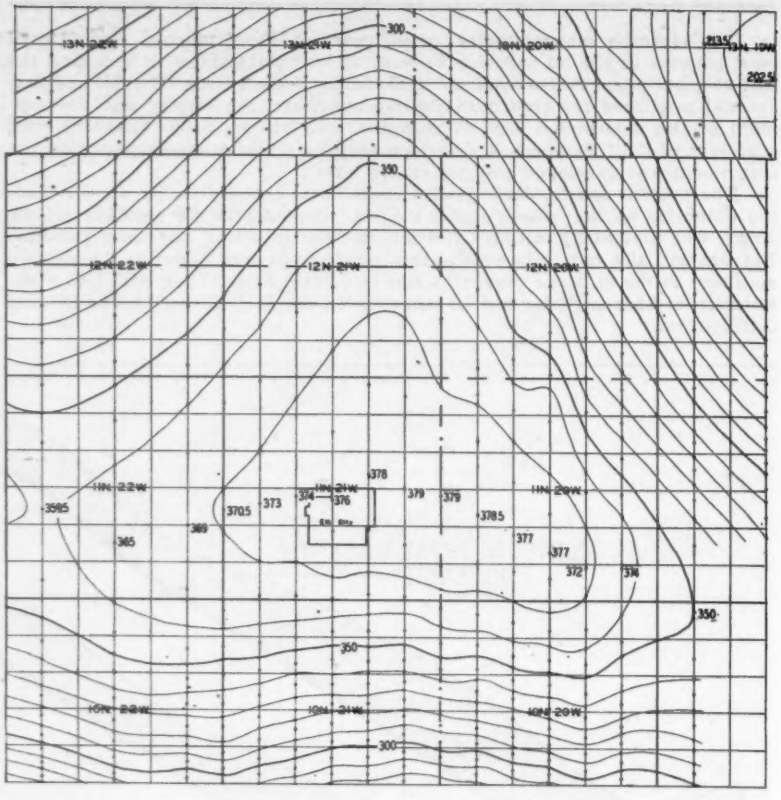
An additional control is achieved through the operation of the stationary magnetometer within the survey area, or at the base headquarters. It has been the practice to set up an airborne magnetometer identical with that flown, to provide an extra operating spare, and to give similarity of records.

Drift Effects

The effects of drift (which is the NOL-BTL instrument always causes an apparent increase in field with time), and the diurnal effect, combine to provide the effect of a constantly increasing ambient field in the illustrated case. It will be noted that the readings at any intersection are higher, the later they are made. It is, of course, necessary to make corrections to these curves, so that a self-consistent contour map can be prepared for analysis.

To make such corrections possible, the surveys are arranged so that the time interval between the crossings of check points is low in relation to the characteristics of the instrument drift and the diurnal variation in the region of the survey. In middle magnetic latitudes, intervals of 15 to 20 minutes will be permissible on most normal days. Then it is assumed that all drift factors within this period are linear with time.

With this assumption, work is started on the base line. The time elapsed between start of the first run of the base line and end of the second run, divided into the change in reading in the two crossings, gives the drift rate. This rate is applied across the base line, both directions, with attention to the fact that drift is a function of time rather than distance. If the plane's ground speed is greatly different in the two runs, then the true curve will not be the average curve when projected on the survey scale. A convenient arbitrary base value is then assigned to some point on the curve.



The corrected base line will now give true values at the intersections with the profiles which were run at right angles to it, but drift will still be present between these true values. Thus, in Fig. 2, showing a section of Fig. 1, in the loop from A to B, it is necessary to add 15 gamma at point A, and 11 gamma at point B. The difference, representing the total error, is then apportioned linearly in time along the loop AB. Since the record chart runs at a uniform rate, it is a simple matter to ascertain the relative times involved in running various parts of the traverse.

Making a Contour Map

Careful attention to all factors affecting the survey permits the making of a very accurate self-consistent contour map representing total intensity, by following the method outlined above. In transcribing the data from profile curve to contour map, actual intersections of contour levels with the traverses are picked out as shown in Fig. 3. Besides the gains from accurate in-

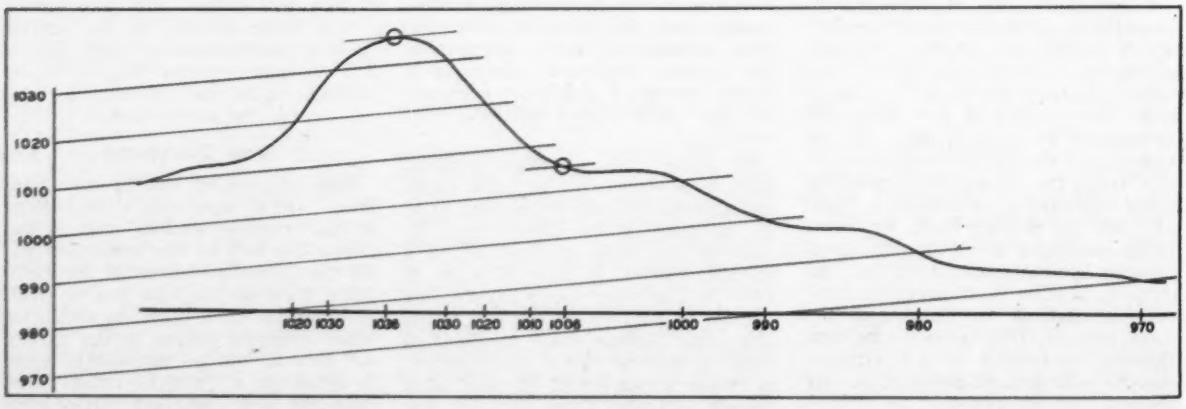
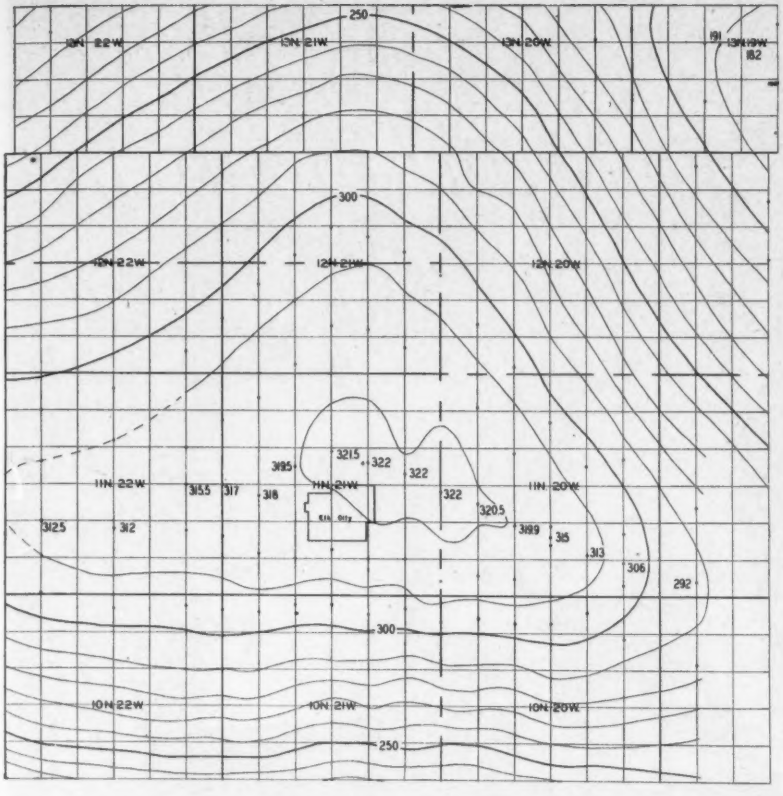


Fig. 3—Section of curve from magnetic profile, showing means of correcting for drift and regional variation while transferring data to contour map.



BOOKS

STANDARD METHODS FOR TESTING PETROLEUM AND ITS PRODUCTS. 7th edition. Published by The Institute of Petroleum, 26 Portland Place, London, W.I. England. 550 pp. 149 diagrams. Price 15s. (Obtainable also from the American Society for Testing Materials, 260 S. Broad Street, Philadelphia. $3.25).

The present edition includes new methods of procedure for estimating the percentage of sulfur present as carbon disulfide in petroleum, and for determining if coagulation of bitumen occurs on exposure of bituminous emulsion to low temperatures. In addition to the new methods, the procedure for determining knock rating of aviation fuel has been completely rewritten to bring it editorially more in line with the corresponding A.S.T.M. method.

The bromination method for determination of tetraethyl lead in gasoline has been extensively altered to shorten the time required for a determination, and warning is given that the method is not recommended for fuels containing a high percentage of unsaturated hydrocarbons.

An innovation this year is the inclusion of a list showing new methods and specifications which have been revised. The revised methods are listed in numerical order and details of the alterations to the methods are given.

OIL CONSERVATION. Published by National Oil Conservation Committee, Bristow, Okla. 28 pp.

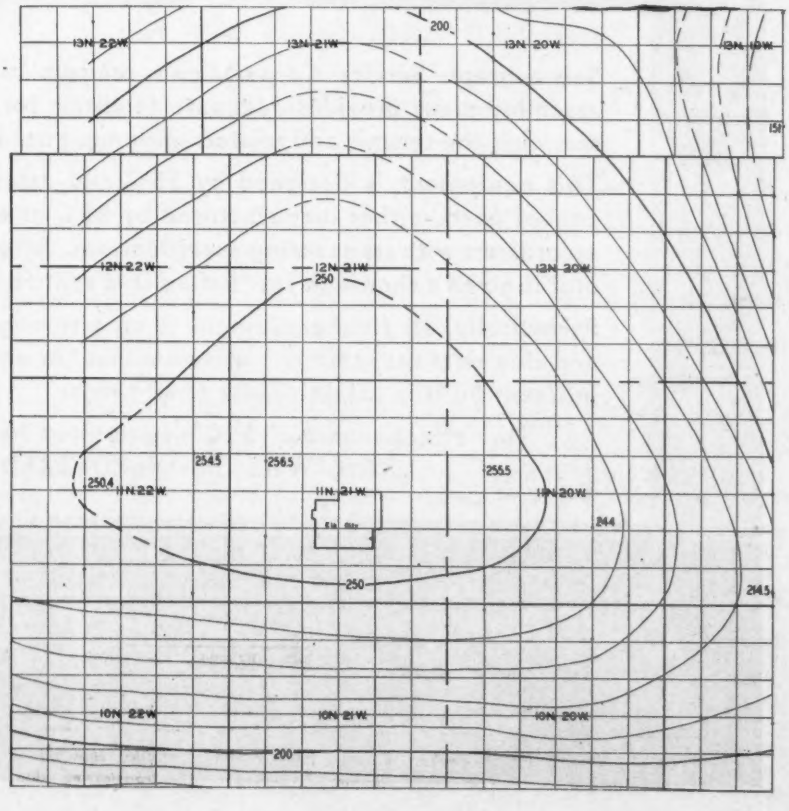
This booklet was written for the purpose of acquainting the American public with the oil industry, and the interdependency of the public and the industry with each other. It points out the excesses of the past, and the need for frugality in the future.

Figs. 4 (top, opposite page), 5 (above) and 6 (below)—Total magnetic intensity maps made at altitudes of about 1,000 ft., 6,000 ft., and 14,000 ft. above the ground in southwestern Oklahoma, showing the effects from differences in altitude. Contour interval all maps is 10 gammas. Correction for regional variation on all maps: minus 7 gammas per mile north and minus 2 gammas per mile east. (U.S.G.S. maps).

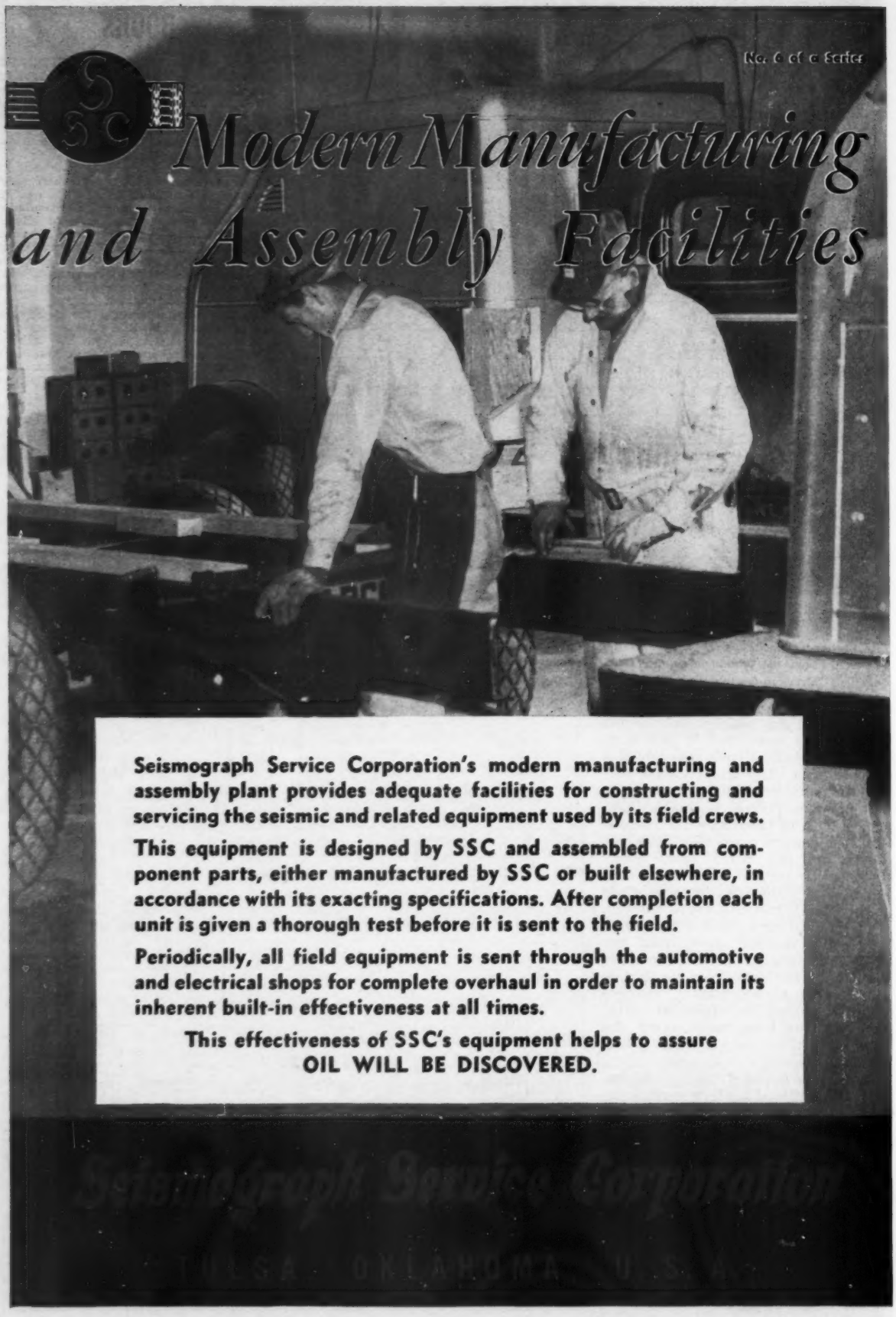
terpolation and registry of maxima and minima permitted in this way, further simplification is also achieved by inserting drift and regional corrections mechanically, through a datum plane tilted to make these corrections. In the figure, the contour intersections are made with lines parallel with this tilted base, rather than to the normal uncorrected one.

An initial simplification was made in all the NOL-GS surveys through a mechanical curve transcriber which takes the original data from the magnetometer, and, in one operation, transforms the data from curvilinear to rectangular coordinates, changes sensitivity scale to a desired value, and controls time scale along the tape length, to correct for varying airplane speed.

It is believed that the operational methods outlined achieve magnetometer surveys whose accuracy fully meets the requirements of petroleum prospecting.



A. L. McColl, retired chairman of the board of Vacuum Oil Co., Ltd., and chairman of the lubricating oil committee of Britain's wartime petroleum board, was named a knight bachelor in the birthday honors list of the King of England.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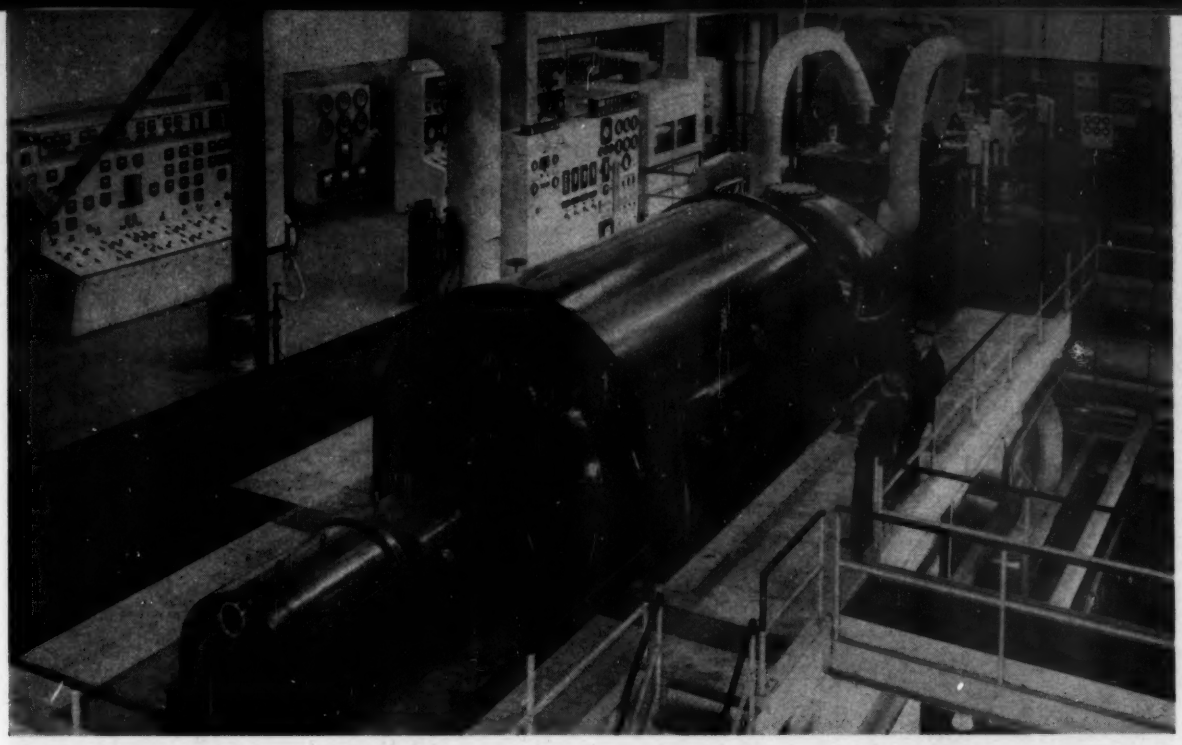

Interior of one of the power plants in California refineries described in this article. View shows 40,000-kw. main generator in foreground, with high and low-pressure turbine elements connected by overhead pipe bends. Process steam is withdrawn below. Control room in background contains all major instruments and controls for boilers, turbine, auxiliaries, and electrical switching, which are controlled by a single operator

PLANT REQUIREMENTS DICTATE DESIGN

. . . for Steam and Power Generation in the American Refinery

PART 3 IN A SERIES*

by William F. Ryan†

AMONG notable public-utility installations for supplying steam and power to refineries are the three plants, basically identical in design, built by Pacific Gas & Electric Co. in California at the Avon refinery of Tide Water Associated Oil Co., the Martinez refinery of Shell Oil Co., Inc., and the Oleum refinery of Union Oil Co. These plants were completed in 1941 and were originally identical with respect to equipment and arrangement, but a second unit has since been installed at Oleum.

These power plants operate at the highest pressure and temperature yet utilized for supplying steam and power to refineries. As in the case of the Louisiana station, the original power generation was in excess of the refinery requirements, and the excess was delivered to the transmission lines of the public utility. Each of these power plants was constructed with one 40,000-kw. turbine generator and three boilers, each having a capacity of 200,000 lb. per hour and an overload capacity of 230,000 lb. per hour. The boilers are designed to produce steam at 1,525 psi. and 940° F. The main turbines are a special design shown in cross-section in Fig. 1. Each unit consists virtually of two turbines with the inlets placed adjacent to each other on either side of the middle bearing pedestal. The shafts are solidly bolted together. One element of this tandem compound machine is a high-back-pressure unit, exhausting at 225 psi.; most of the exhaust is withdrawn to supply process steam, and the remainder is delivered to the low-pressure element which is a straight condensing machine. Through a combination of speed and automatic extraction governing, operation of the turbines has been worked out in such a way that the high and low-pressure elements are controlled almost as though they were separate machines.

The high-pressure turbine is designed for a maximum flow of 675,000 lb. per hour and any part or all of this flow except that required to cool the low pressure turbine and the gland leakage may be extracted at 225 psi. Under these conditions the unit will generate 32,500 kw., but by utilizing more steam in the low-pressure element the total output of the combined unit can be increased to 43,500 kw. The greater part of the 225-psi. exhaust is condensed in evaporator condensers which supply steam at 165 psi. to the refinery. The 225-psi. steam is also used for power-plant auxiliaries, the exhaust from which is used for heating the condensate from the low-pressure element of the main turbine and the treated water fed to the condenser evaporators. Residual superheat in the 225-lb. exhaust is used in a heat exchanger to superheat the process steam before it is delivered to the refinery. The over-all heat balance is shown in extremely simplified form in Fig. 2.

As shown on this diagram the steam-feed water system consists of two closed circuits and one open circuit. The exhaust withdrawn from the high-pressure element of the turbine is condensed in the evaporator condenser and after deaeration in the feed heating cycle is returned as high pressure condensate to the boilers. The other closed circuit consists of the low-temperature condensate from the low-pressure element of the turbine which is preheated by exhaust

*Parts 1 and 2 appeared in the issues of June 29 and July 6.

†Stone & Webster Engineering Corp.

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from auxiliaries and then combined with the high-pressure condensate in a deaerating heater, from which both are returned to the boiler. To replace leakage from these two closed cycles some of the 160-psi. steam generated in the evaporator condenser is condensed and returned to the feed water system. The open circuit is a supply of raw water, properly treated, preheated by power station auxiliaries, and delivered to the evaporators from which the vapor is superheated in the heat exchanger and then delivered to the refinery where it is lost to the power-plant cycle.

This system solves completely and effectively the feed-water problem so far as the high-pressure boilers are concerned. There is still a feed-water problem in connection with the supply for the evaporators although the lower temperature conditions and the lower rates of heat transfer make this a relatively minor one. The serious disadvantage of this system is the sacrifice of byproduct power when the steam is extracted at 225 psi. instead of 145 psi., which is all that is required for refinery use. This sacrifice amounts to approximately 16½ per cent. However, for some raw waters it may be the only feasible method of generating byproduct power. This is certainly true in those places where the only available water supply is highly saline approximating the analysis of sea water, and unfortunately, some rich oil countries are devoid of any natural water supply which can be made fit for boiler use by any practical method of treatment.

In a power plant recently designed for installation on the Persian Gulf a definite effort was made to collect and return condensate from the refinery to the power plant. Nevertheless, much of the steam is used in direct contact and cannot be recovered. In this case a compromise was made, part of the refinery's steam being supplied directly at 150 psi. from the exhaust of back-pressure turbines and part from evaporator condensers energized by 225-psi. steam extracted from a condensing turbine. The arrangement is shown diagrammatically in Fig. 3.

An interesting feature of these P.G.&E. plants is the arrangement of controls. No plant of this magnitude could be designed, in the present state of the art, for one-man operation, but these plants are intended for one-man control. The principal gage boards and controls for boilers, turbines, condensers, feed-water system, and electrical switching are centrally located where a single operator can observe the essential indicators and meters, and make all major adjustments by remote control. The accompanying photograph shows the arrangement of the gage and control boards and also provides an excellent view of the main turbine generator shown in cross-section in Fig. 1.

Present Status of the Refinery Power Plant

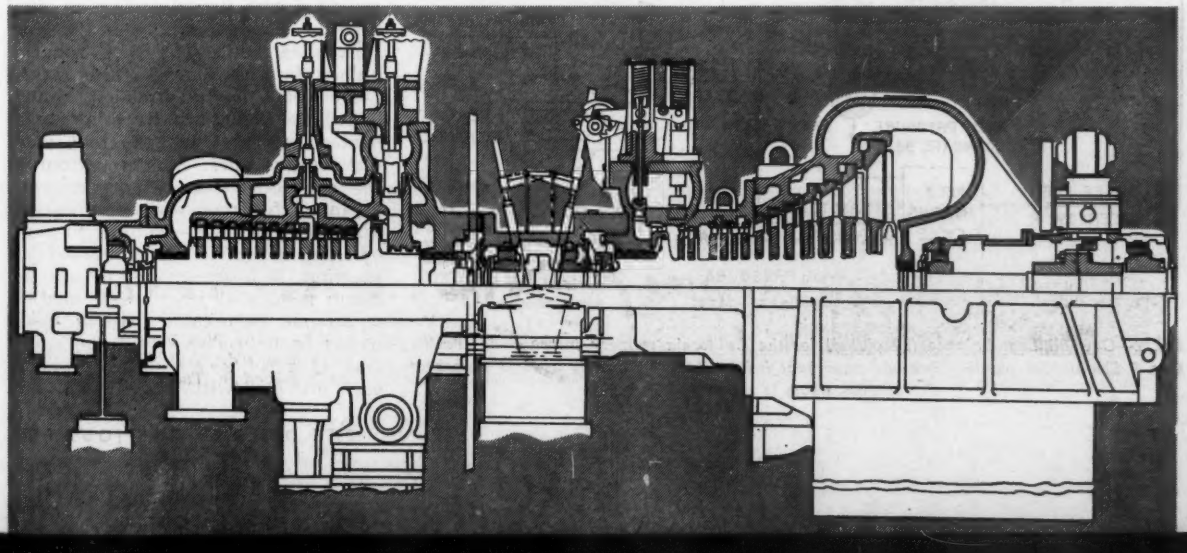
The foregoing is a general review of prewar refinery power plants. No technological advances are recorded from the few installations made during the war. Scarcity of manpower and materials required considerable conservation and many refinery-power-plant extensions were actually constructed using second-hand equipment designed 20 to 40 years ago. One plant now under construction is using a steam pressure and temperature comparable to those of Pacific Gas & Electric Co.'s plants and this plant will use treated water. The elimination of the evaporator cycle will materially increase the yield of byproduct power but the feed water treating plant may cost more than $1,000,000 by the time the ultimate plant is constructed and a continuing problem in operation will be incurred. This review may be said to report the state of the art as it stands today, and in the following paragraphs we shall consider how technological advances, already established in other industries, might be utilized for more profitable generation of byproduct power in American refineries.

Coordination of Refinery Processes With Power Generation

In designing a refinery power plant, it should be borne in mind that the refinery itself is a potential source of energy by the generation of steam from waste heat. On this account, refinery operation is intimately tied into the power-generation cycle, all the more so because the design of process equipment may be arranged to affect the demand for steam which has previously been used to generate electric power. For the most efficient operation, both in the power plant and the refinery, this steam may have to be supplied at several different pressures. The power engineer and refinery engineer, if not actually the same person, must work in close cooperation. Each should have an intimate knowledge of the other's problems, and each should understand how situations advantageous to power generation may be detrimental to the process, and vice versa, so that the ultimate design will provide the most satisfactory balance between the two operations, and so achieve the lowest manufacturing cost of refinery products. An opportunity for the generation of cheap steam in the refinery processes should not be neglected because it may interfere with the heat balance in the power house. Steam should not be used for heating in large and expensive low-pressure equipment, in order to provide a greater outlet for low-pressure steam from the power plant, when the over-all economy would be better if high-pressure steam were used, with less heat-exchange surface, for process heating.

The refinery conception of battery limits is a great practical convenience but it may work a severe hardship to over-all economy. It is obviously convenient to generate all the steam required and to use all the steam gen-

Fig. 1—Cross section of special turbines used to drive 40,000-kw. generators. High-pressure element at left, supplied with steam 1,450 psi., 950° F. exhausts at 225 psi. Excess steam at this pressure, not needed for refinery, is used in low-pressure element, right, for additional power generation



erated within the same battery limits, but it may be more profitable to the refiner to take high-pressure steam out from the battery limits and return low-pressure steam from some other source.

Careful consideration must be given to the type of power drives used for refinery auxiliaries. It should be conceded that steam drives in the refinery, either turbine or reciprocating units, are less efficient under most conditions than the large generators in the main power station. On the other hand, there is no point in generating large quantities of byproduct power only to consume it in motor drives. When a refinery generates its own power, the capital cost of motor drives is not merely the motor itself, its controls and it wiring, but includes a pro rata share of the installation cost of the additional equipment required for producing and distributing the electricity, whereas the cost of a steam drive includes a proportionate share of the boiler plant, as well as the cost of turbine and piping. Steam drives afford great convenience of control, particularly for variable speed equipment, and this may entirely outweigh any thermodynamic advantage of central power generation for motor drives. These few points are sufficient to indicate the intimate relation between refinery processes and power generation and emphasize the opportunity for highly specialized design in connection with refinery steam and power generating installations.

Generation of steam from waste heat recovered in oil-refinery installations can often be practiced with great advantage and may result in a high over-all heat economy at low investment cost. The heat exchange from oil to oil can be applied only to a limited degree, if the recovery of heat must be justified economically. Reason for this is that the cost of recovering waste heat in a closed operating system increases rapidly when a higher percentage of heat recovery is wanted. The design of oil refineries is primarily a problem of economics involving the selection of equipment which is simple to operate at reasonable first cost. The possibilities of extending heat exchange appear to lie entirely in the direction of producing steam from the waste heat of the various process plants.

Waste heat contained in the flue gases of oil heaters (tube stills), especially those operating at a high temperature, and waste heat from oil streams which can not be used with advantage for the preheating of charging stock, are the sources of heat for generating steam. The generation and superheating of steam in the convection bank of tube stills can be effected in a variety of ways and will always result in an efficient utilization of the fuel burned.

The oil streams to be heated in tube stills of vacuum distilling and cracking plants enter the stills at temperatures normally in excess of 600° F., while the furnace-flue gases leave with an exit temperature of 1,000° F., and higher. Under these conditions, a fraction of the waste heat could be utilized for air preheating but this is not always done as the equipment required may complicate the plant layout and plant operation to a considerable degree.

Tube-still heaters in their present design contain radiant heat tubes disposed around the walls of the combustion chamber and convection tubes arranged in banks through which the flue gases flow to the stack. The oil stream normally enters at the cooled part of the convection bank and flows in series through the convection bank. The various radiant-heat tube sections are arranged at the roof, floor, and side walls of the combustion chamber, where the final heating and evaporating conditions are achieved.

The design of tube stills presents a balance between the size and first cost of the tube still and its thermal efficiency and fuel cost, but the design has tended toward a maximum use of radiant-heat tubes at the sacrifice of convection tubes because the high heat-transfer rate obtainable in radiant-heat sections results in a furnace design of low cost and also permits rapid heating of the oil at a small pressure drop. This tendency is accentuated in the case of cracking heaters where the high operating temperature calls for the use of costly alloys for heating tubes and tube fittings.

The utilization of part of the convection section for steam generation appears to be in harmony with the objective of low cost furnace design and provides high fuel efficiency, since this type of steam generation will reduce flue gases and temperatures to a great degree. A typical arrangement for generating steam in tube stills comprises a boiler drum installed adjacent to the oil heater and provided with the necessary boiler fittings, such as gage glasses, level regulator, safety valve, and blowdown connection. Preheated boiler feed water is introduced into this drum from which a circulating line leads to a nest of heating tubes located in the lower part of the tube still's convection bank. The water flows countercurrent to the flue gases in an upward direction through rows of horizontal tubes. The mixture of water and steam generated is discharged to the boiler drum where steam is separated. The water circulation through the steam generating tubes in the convection bank can be of the natural or the forced flow type, the latter requiring a circulating pump but offering increased steam capacity and better heat transfer.

The steam generating tubes can be bare steel tubes or tube elements provided with finned surface as often used for economizer duty. In the same convection bank, but in a zone of higher flue-gas temperature, superheater tubes may be provided through which the steam produced is superheated before flowing to the steam distribution lines. At the bottom of the convection bank, tubes may be arranged for feed-water preheating. Since oil heaters are subject to periodic shutdowns for cleanout and inspection, it is preferable to use the steam generated from waste heat in or around the process plant in which it has been produced, but the existence in a refinery of several plants, each provided with waste heat steam

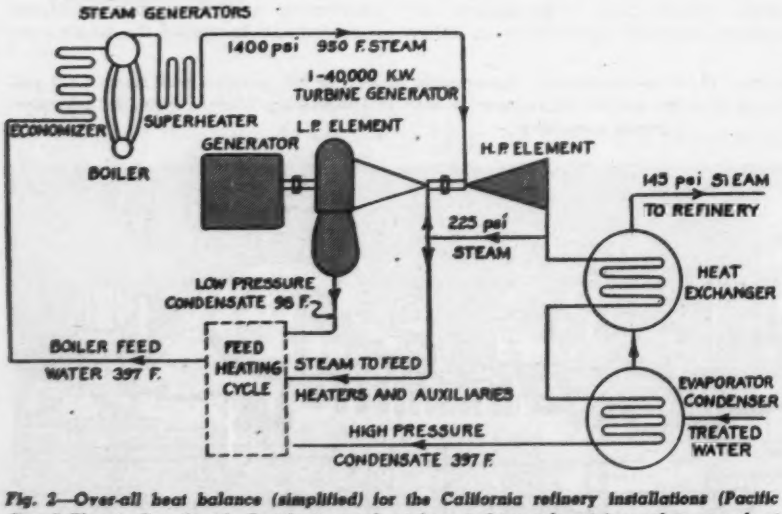
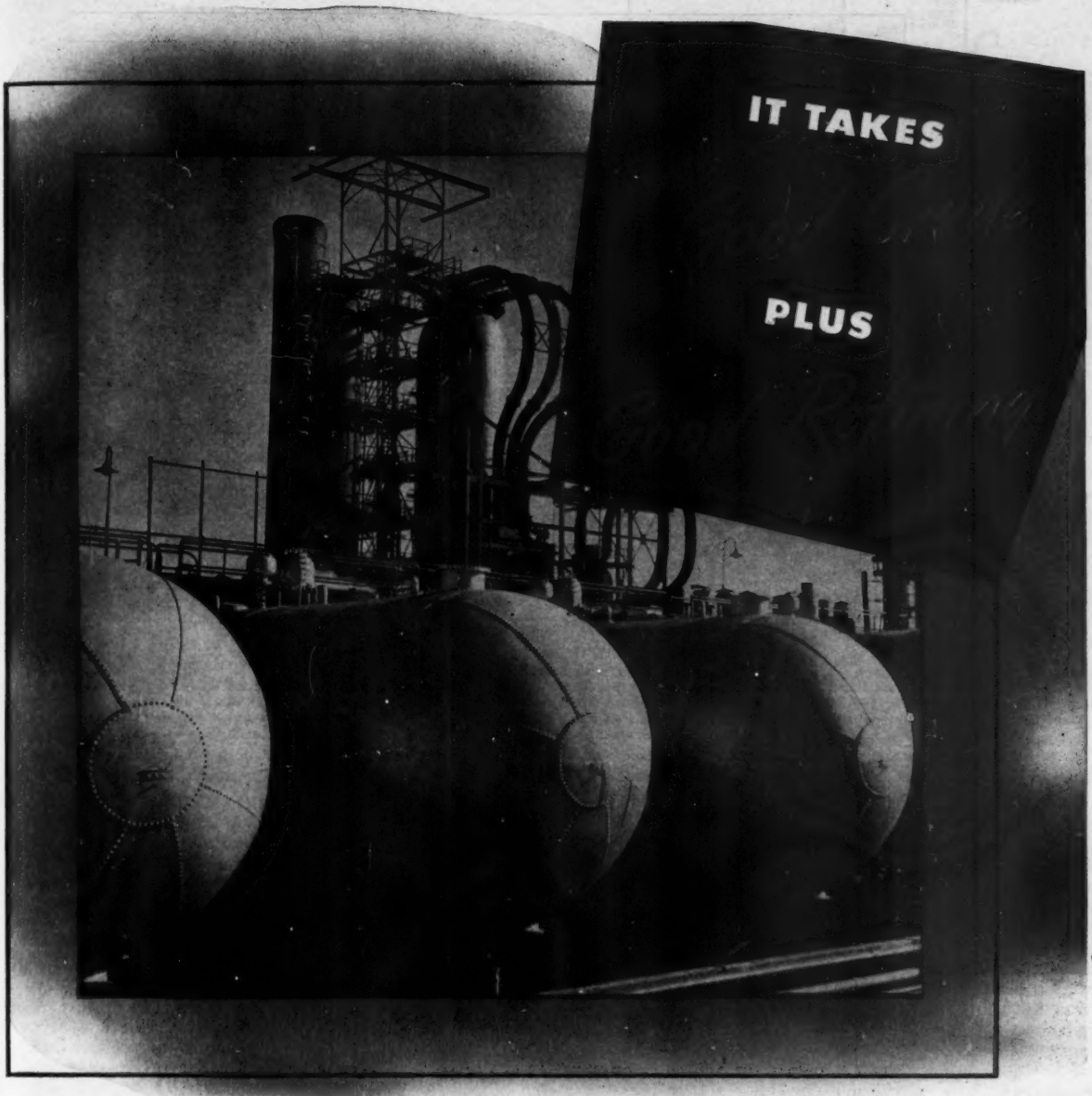


Fig. 2—Over-all heat balance (simplified) for the California refinery installations (Pacific Gas & Electric Co. plants). Residual superheat from turbine exhaust is used to superheat process steam to refinery



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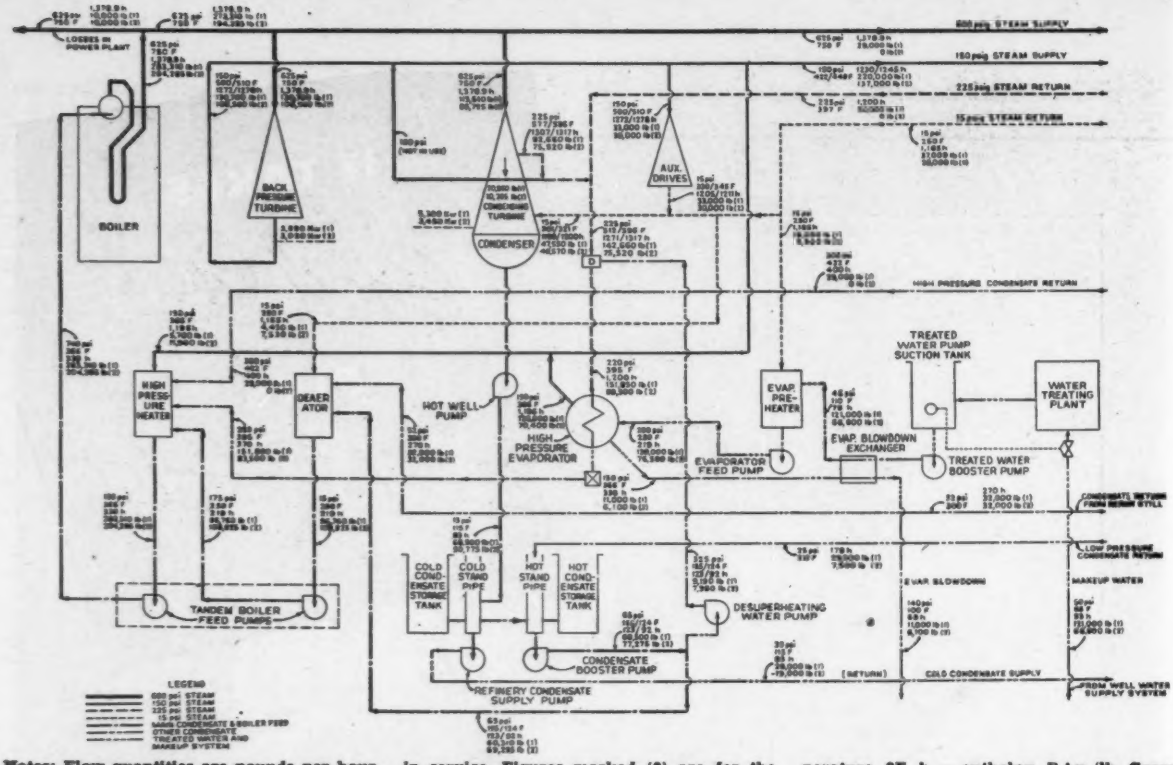

Notes: Flow quantities are pounds per hour for the following load conditions with one condensing unit available. Figures marked (1) are for the basic design with F.C.C. unit in service. Figures marked (2) are for the actual operating conditions with the F.C.C. unit eliminated from the refinery. Pressures are pounds per square inch gage. F = temperature, °F. h = enthalpy, B.t.u./lb. Gross generation, 9,190 kw. (1), 6,540 kw. (2). Electrical auxiliaries, 350 kw. (1), 350 kw. (2). Net electrical output, 8,840 kw. (1), 6,190 kw. (2).

Fig. 3—Heat balance, refinery power plant, in area devoid of fresh water. Maximum possible condensate returned from refinery. Make-up steam to replace lost condensate is supplied at 150 psi. from condenser evaporator, energized by steam, extracted at 225 psi. from condensing turbine generator

generators, provides a diversity factor that makes it unnecessary to sacrifice over-all economy, merely to use steam at the point where it is generated. Waste-heat steam can be generated in tube stills at any desired pressure, but ranges from 125 to 450 psig. and steam generating capacities from 5,000 to 25,000 lb. per hour appear best suited for economical reasons.

The generation of low-pressure steam can, with advantage, be effected by heat exchange with hot oil streams.

The generation of steam from hot oil (vapor and liquid) streams of distilling and cracking plants is the alternative to cooling with water and is of real advantage in many refinery plants where the heat content and the temperature of the oil streams are suitable. Such steam generation can be combined with similar facilities operating in connection with tube stills. The cost of boiler drum and feed water supply can be spread over both heat recovery systems.

When generating steam from hot oil products the increased cost of plant investment, as compared with refinery plants using water-cooling equipment exclusively, is often compensated by savings in investment and operation of the cooling water system, by fuel savings and in reduced first cost of the main boiler house. This method is inimical to obtaining the highest yield of by-product power in the main generating plant, where the natural desire is to exhaust at the lowest possible pressure. Nevertheless, it may result in the lowest ultimate cost of refinery products, and emphasizes the fact that in designing the power-plant heat balance, the operation of the entire refinery must be understood and considered.

Low-pressure-steam generation is effected in tubular heat-exchange equipment, mostly of the kettle-evaporator type as used in production of distilled water. Hot oil flows through the tubes and steam is generated in the shell space but the reverse is true in certain other types of heat exchanger equipment which are also used. The generation of steam from hot oil is applied in a variety of services, such as the removal of sensible heat from hot oil liquids and the condensation of oil vapors. When condensing, all latent heat and part of the sensible heat of the distillate can be utilized for the generation of steam provided the operating conditions permit such heat recovery. This is normally the case in most cracking installations and in vacuum distillation. The recovery of heat from overhead vapors not only makes use of the latent heat of the overhead distillate but also of the heat of reflux which is required for the proper operation of fractionating columns. Usually such reflux is taken out of the column in the form of vapor, condensed and pumped back, but reflux fluid may be provided also by the withdrawal of hot oil from a tray inside the tower which is cooled and returned again to the tower. This latter system of refluxing is practiced for the purpose of concentrating heat removal at an intermediate point of the fractionating column. It offers special attraction for steam generation since the stream which is being recirculated is at higher temperature than the overhead vapors.

In topping plants and gasoline-rerun units, the overhead vapors are normally too cool to permit the generation of steam at a pressure corresponding to the service pressure of the low-pressure steam main. The value of utilizing such steam is doubtful unless a turbo blower is installed to raise the steam pressure for ultimate utilization as heating or stripping steam.

All of these questions, when to generate steam, at what pressure to generate it, whether it should be superheated, and whether it should be utilized within or without the battery limits, should be answered with careful regard to their relations to the power generating cycle in the main power plant.

SECONDARY RECOVERY *Engineering*

. . . Current Concepts of the Subject

by N. van Wingen and Norris Johnston†*

Secondary recovery is a leading subject in practically all oil-producing areas. Here is given a highly instructive section of a paper designed to meet one phase of such work that many engineers have asked for: a condensed summary of theoretical concepts, or the "engineering standpoints," as they stand in the literature. From the Los Angeles 1946 meeting of the A.P.I., Pacific Coast production district.

THE available literature pertaining to secondary-recovery methods of operation can be divided into two general classifications: (a) those dealing with the analytical and technological aspects of the subject, and (b) those describing results as actually obtained in various fields and pools.

The majority of research performed to date has dealt with unconsolidated sands and has been conducted without the consideration of a second immiscible liquid phase to simulate interstitial water. Yet, as producing sands normally contain water, it is to be seriously questioned if results of experimental laboratory work on samples 100 per cent oil saturated can be applied to actual field problems. Likewise, it is to be cautioned that any conclusions based on experimental work performed with one type of sand do not necessarily apply quantitatively to any other sand. Also, great care should be exercised with regard to the application of results of laboratory experiments to problems of reservoir behavior as a small model may not always adequately duplicate the behavior of the prototype.

Bearing the above limitations in mind, the following statements summarize current knowledge of theoretical concepts pertaining to secondary-recovery methods of operation:

Sand Characteristics

1. Recoveries from different sands having comparable fluid saturations may be quite different because of inherent differences in the sands themselves.[1 2 9]

2. Water flooding has been most successful in fine-grained tightly cemented sands. It is significant that such sands characteristically have a high residual-oil content prior to flooding.[9]

3. The treatment of core samples in the laboratory is frequently such as to destroy the original conditions prevailing on the solid surfaces so that water-flood studies with such samples probably yield results which have very little meaning so far as actual reservoir behavior is concerned.[3]

4. In a petroleum reservoir, both oil-wet and water-wet sand surfaces coexist with a predominance, however, of the water-wet surfaces.[3]

5. Minerals found in oil reservoirs are chiefly silica and calcite, both of which are hydrophilic. However, the nature of the materials adsorbed on the mineral surfaces may determine whether the solid phase is hydrophilic or hydrophobic.[9]

Fluid Characteristics

1. The viscosity of oil if within certain limits appears to be of less importance than the saturation in governing the ultimate efficiency of oil recovery.[1 3]

2. Oils successfully subjected to secondary-recovery operations have ranged from 2 to 30 times the viscosity of water.[3]

3. Other conditions being equal, the time required for any given recovery varies directly with the viscosity.[3]

4. The produced water-oil ratio for a given recovery increases with the oil viscosity. Hence, economic ultimate recovery is diminished correspondingly. However, if the economics of recovery are disregarded, ultimate recovery is independent of viscosity.[3]

5. The fluid with the greater adhesion tension with reference to the solid phase will tend to displace the fluid with the lesser adhesion tension.[9]

6. As gas is a nonwetting phase, it will pass through channels already open and will tend to move the oil by viscous drag rather than by piston action.[9 7]

7. The effective permeability of the sand to a fluid phase is inversely related to the difference in pressure across the interface between the fluid phases (capillary pressure). As the saturation of a fluid phase decreases, its capillary pressure increases, and the permeability of the sand to that phase decreases.[3 20]

Fluid Displacement

1. The displacement of oil is probably accomplished by the same mechanism, irrespective of whether water is introduced artificially or by natural encroachment.[9]

2. Displacement of oil from the reservoir involves the disturbance of the equilibrium between interfacial tensions of four phases: gas, oil, water, and solid minerals.[3 20]

3. Capillary forces are important in determining the most advantageous rate of advance of the injection medium.[1 3]

4. Artificial control of interfacial tension between water and oil by use of surface active chemicals has so far failed in practical application because the surface active agents become adsorbed upon the solid surfaces and the advancing water front is depleted of these agents before any beneficial effects can be observed.[3]

5. The type of three-phase diagram developed by Leverett and Lewis[21] can be adapted to show gas-oil ratios and water-oil ratios of the flowing stream which, in turn, will clearly indicate the saturation ranges for which either water or gas drives are economical. For the specific conditions investigated by these authors upon which the diagram is based, it is concluded that no oil flows when its residual saturation is less than 15 per cent. It is indicated, furthermore, that the presence of interstitial water makes it possible to obtain a higher ultimate per cent recovery of the oil originally in place.[1 2 5]

6. Indicated recoveries as obtained from laboratory flooding of core samples generally agree with results computed using reliable relative permeability data.[5]

7. Gas and water saturation are important in determining the ratio of the injected fluid to oil. Thus, if the initial mobility‡ of the water is greater than that of the oil, water flooding may not be economically feasible because of excessive water-oil ratios.[1 2 3 5 9 12]

8. The two saturation conditions which are critical to the success of secondary-recovery operations are: (1) That at which a small decrease in liquid saturation will produce continuously connected flow channels for both liquid and gas, and (2) that at which the water becomes more mobile with the oil.[3]

9. The critical saturations depend upon the interfacial tensions of the various phases and the pore size dis-

*Richfield Oil Corp. †General Petroleum Corp.

‡Mobility is here defined as the effective permeability of a sand to a fluid phase divided by the reservoir viscosity of that fluid.

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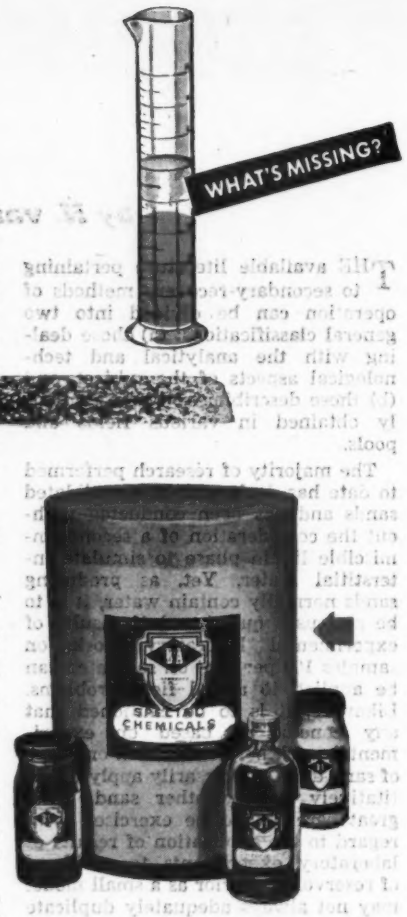

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tribution. Attempts to correlate experimental data on the basis of a "mean" pore radius are not valid because the critical saturations depend upon the size of the larger continuous channels.[2]

10. The initial stage of water flooding creates a bank of oil ahead of the drive, provided that initially the mobility of the oil is greater than the mobility of the water. During this period displacement is by piston action and oil recovery efficiencies are high.[1 2]

11. The initial stage is followed by the subordinate or friction-shearing action stage (viscous drag). This displacement mechanism is inefficient as compared to the initial stage.[1 2]

12. In the case of a gas drive an action like that of a water drive occurs, except that the initial stage is always short and may even be nonexistent and the subordinate stage is long.[1 7]

13. Fingering of an encroaching front occurs when the mobility of the driving fluid is greater than that of the driven fluid.[6]

14. Gas bypassing may be reduced by adding liquid to input wells in sufficient quantity to reduce the effective permeability to gas.[10]

15. The sweeping efficiency of a flood depends on the arrangement of input and output wells.[2 10]

16. Within limits, wider well spacing may be offset by higher injection pressures.[2]

17. Flooding efficiencies of the various well patterns can be compared on a theoretical basis as follows: Line drive, 71 per cent; staggered line drive, 80 per cent; five-spot pattern, 72 per cent; seven-spot pattern, 74 per cent. Thus, it is to be noted that the efficiency of the various well patterns is approximately the same.[2 10 23]

18. Because of the presence of free gas in the formation, more water must be injected than the total oil and water ultimately produced.[2 3]

19. In order to avoid lifting the overburden, the maximum bottomhole injection pressure should not exceed approximately 1.5 psi. per foot of depth, the actual value being a function of the characteristics of the formation.[2]

20. Delayed drilling of production wells in a reservoir with a nonuniform sand will generally result in a greater ultimate recovery provided the water is introduced into the sands at a balanced rate through each intake well so as to prevent an offcenter concentration of oil within the pattern.[11]

21. Actual field data for a uniform sand have shown that no benefits were derived from delayed drilling and that in some cases a lower recovery actually was obtained.[2]

22. The behavior of water-input wells, water requirements for a lease, and injection pressures can be predicted on the basis of an analytical method which combines the equations for radial encroachment with those of the steady rate for various flooding patterns. Data so computed have been found to correlate with actual performance.[10]

23. The chief value of electrolytic model studies of secondary-recovery operations is in predicting the relative value of different flood patterns.[2]

24. Mathematical analysis shows that electrolytic models behave in accord with the properties of incompressible fluids, or in special cases isothermal perfect gases.[2]

25. Instability of water-oil interface resulting from an unfavorable viscosity ratio for the two fluids has not as yet been successfully represented in electrolytic models.[2]

26. Anisotropic sand conditions can be only partially duplicated in electrolytic models.[2]

Recovery Efficiency

1. Current usage defines flooding efficiency as the ratio of the area flooded to the total area. A more precise concept, however, would involve the ratio of volume flooded to the total volume. A prime prerequisite of successful secondary-recovery operations is a sufficiently high oil saturation to assure mobility of the oil. In the evaluation of any area for secondary-recovery possibilities, saturations should therefore be expressed in terms of per cent of pore volume filled. Any indication of oil content expressed in terms of barrels per acre or even barrels per acre-foot is misleading and may lead to costly failure as it furnishes no clue with regard to the probable displacement efficiency which might be obtained in the reservoir.[1 2 3 9]

2. Most likely prospects for secondary-recovery operations lie in pools produced under a depletion type mechanism in which little attention was given to the conservation of reservoir energy.[3]

3. Preparations for secondary-recovery operations should include assembling and interpreting all available information concerning the property with regard to information pressures and core analysis, the availability of old wells for either production or injection, the availability of a supply of suitable displacing fluid, estimated injection pressures, and the probable size of the plant which will be needed.[2]

4. Interpretation of laboratory core tests for the purpose of estimating probable recoveries is difficult as the degree to which the core has been flushed by drilling fluids and the nature of the liquid lost due to the gas expansion cannot be readily evaluated. Thus, interpretation often has to be made on an empirical basis.[1]

5. The oil saturation of a sand can be reduced to a lower value by a gas drive if the sand has a high water saturation, as higher liquid saturations mean lower gas saturations and hence a lower permeability to gas.[2 6]

6. Sands containing much water but little gas may be successfully gas driven, while sands containing little water may be water flooded to advantage.[1 2 5]

7. Where either method can be used successfully, the effectiveness of a gas drive is generally less than that of a water drive.[2]

8. Because of rapid increases in permeability to gas and decreases in the permeability to oil secondary gas drive operations are essentially a method for obtaining a given ultimate recovery within a shorter time period.[2]

9. In lenticular but continuous sands the highest recovery can be obtained at rates of production so low that the capillary creep in the tight channels can keep pace with hydraulic flow in the more permeable sands. However, such a production rate may be uneconomic.[4]

10. Field reports indicate higher rates of recovery, lower gas-oil ratios and higher ultimate yields for conditions of intermittent injection. This cannot be substantiated by laboratory tests performed on small radial or linear samples. This difference in the field behavior is due to (1) local variations in sand permeability, (2) redistribution of flux lines when input wells are shut in, or (3) changes in pattern arrangement, thus allowing a sweeping of "dead spots."[8]

11. To be successful, each intermittent cycle must be of sufficient duration to allow for an adequate redistribution of flux and equi-potential lines. If the time cycle is too short, the net effect is merely equivalent to continuous injection at a lower pressure. A few field tests for sands of less than 100 md. permeability have indicated that the proper time period should be of the order of 6 months. Extremely high effective permeability will shorten the length of the necessary time cycle.[8]

12. Theoretically it can be demonstrated that the necessary injection portion of the time cycle can be shortened by increasing the injection pressure. However, the corresponding decline period depends on fluid production rate which is limited by the conductivity of the entire system.[8]

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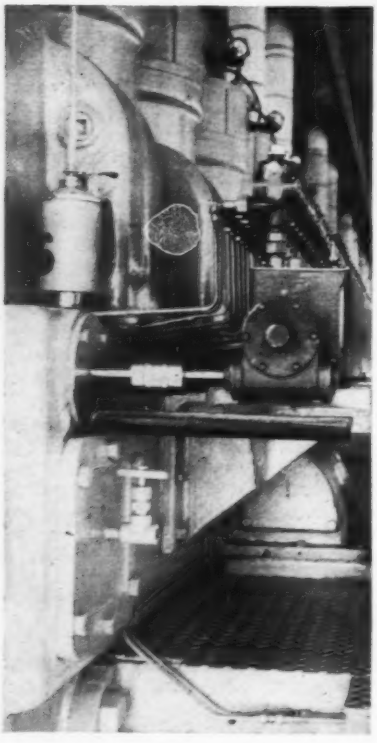
(Continued on page 103)

OPERATING IDEAS

Oil Retriever Aids Good Housekeeping

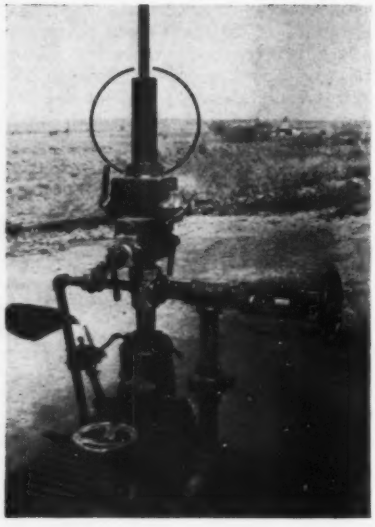
OIL retriever, made from half of a 2-in. pipe bolted to the engine block, catches any oil from the drive shaft on the force feed-lubricator. At this point of the engine it is hard to eliminate all leakage. It is not uncommon to find cans and buckets placed under this point which are easily turned over or spilled. In a



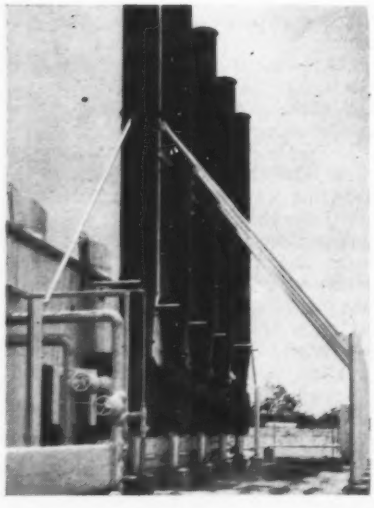
receptacle about 2 in. deep and 6 in. across is placed the hand operated oil can when not in use. This oil can holder is not attached to the engine but has sufficient weight so it will not vibrate out of position like an oil can so often does, spilling oil on the floor or floor plates.

Lubricator for Pumping-Flowing Wells

WELLS which flow by heads as a result of "agitation" by pumping sometimes suffer damage to the polished rod. This is because after a head flow, the tubing is partially or completely empty, and there may be



a want of lubrication later on at the polished-rod packing. To supplement the internal lubricating supply in the stuffing box, this operator (Wichita County, Texas) has added a lubricator extension chamber above the packing gland. Some operators even erect a barrel at the side, connected via small diameter tubing, to provide additional capacity.

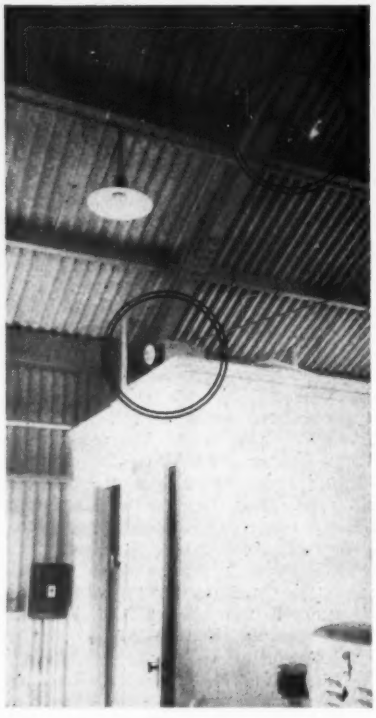


Boiler-Stack Bracing

DUE to 80 and 90 m.p.h. winds which are often experienced in the Rincon pool of South Texas, it is necessary to use unusual steps in bracing boiler stacks. Two-inch piping is used in bolting the stacks together, and the braces are attached to 4-in. posts made of piping. These are set in and filled with concrete. This bracing withstood a 95 m.p.h. gale which occurred in the last week of May 1946.

Automatic Emergency Light In Compressor Station

AUTOMATIC emergency lights, in gas-compressor station of Canadian River Gas Co., Dalhart, Tex. Electricity for lighting and auxiliary power is purchased from a local utility company. Due to electrical storms and ice-coated transmission lines at this location, however, a number of



emergency blackouts have been experienced. When this happens, it is necessary to cut out the electric motors driving pumps and start up the standby generating plant. This is a difficult task to do quickly in the dark, so the company engineer designed an emergency lighting system operated from storage batteries that automatically kicks on whenever the regular current stops. When the standby generating unit is started the battery system in turn kicks off. The emergency lights are of the focused-beam type and are pointed in such directions that the standby generator is illuminated, as well as other key places in the building, whenever the regular lighting facilities might happen to go out.

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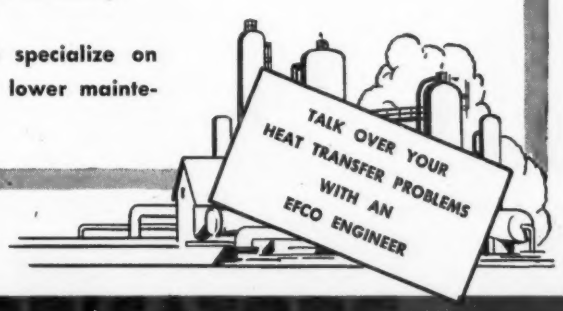

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Casing-Cementing Practices Improved In Illinois-Indiana-Kentucky Completions

by J. L. Rogers

Here is engineering material on alloy casing windows, multiple completions, wall cleaning guides and casing centralizers, cementing practices—all concerned with getting successful completions. The article was presented at the recent annual meeting of the Kentucky Oil and Gas Association at Lexington. The author is district engineer, at Carmi, Ill., for Carter Oil Co.

THE relatively short time interval required for running and cementing casing is one of the most critical periods in the entire life of an oil or gas well. Even where depth is not a factor of primary importance, the cementing of casing usually presents one or more problems which must be solved before an area can be economically developed.

Problems associated with casing cementing in the eastern interior coal basin are best illustrated by reviewing briefly the characteristic geological conditions of this territory. Oil is being produced in the tri-state territory designated as the eastern interior coal basin from at least 15 different sandstone pays of Pennsylvanian and Mississippian age, plus 7 or 8 separate and distinct porous zones of the McClosky lime. In certain areas the St. Louis, Devonian, and Trenton limestones also contain porous productive zones.

The more common oil horizons occur at subsurface depths of 1,300 to 3,400 ft., but Pennsylvanian sands have been successfully completed at 700 to 800 ft. and Trenton completions in some pools are more than 4,500 ft. in depth. As would be anticipated in an area where a number of prospective oil zones are present but where their occurrence is erratic, a large proportion of the wells in the territory are completed as multiple-zone producers. The cementing problems commonly associated with deep drilling are seldom encountered but because of the relatively low reservoir pressure and the nature of the productive sandstones and limestones, it is usually desirable to use nitroglycerin shots or acid treatments if successful completions are to be made. It is, therefore, often necessary to insure a cement seal for some distance above the casing shoe which is sound to the extent that application of nitroglycerin shots and acid treatments to the various exposed zones does not result in the need for squeeze cementing.

An index to activity as far as multiple-sand work is concerned may be found in Table 1, which shows aluminum-alloy window completions and total well completions by years. Most of the completions during 1939 and 1940 were in the Salem and Loudon pools where magnesium-alloy casing windows were satisfactory because of the short distance between windows and shallow depths. As development moved into the southeastern part of the basin aluminum-alloy casing requirements increased to a peak of 405 windows during 1941. In 1942 and 1943 wartime restrictions virtually stopped the use of this material altogether. After these restrictions were lifted, the use of the material was resumed in an even greater proportion to total completions recorded.

Presence of water-bearing horizons

TABLE 1—ALUMINUM ALLOY WINDOWS AND OIL WELL COMPLETIONS IN EASTERN INTERIOR COAL BASIN YEARS 1939 THROUGH 1945

Year—	No. of aluminum alloy windows	Total oil-well completions	Ratio of aluminum alloy windows to total completions, per cent
1939	164	3,379	4.85
1940	271	3,441	7.88
1941	405	3,237	12.54
1942	42	1,358	3.09
1943	0	1,377	....
1944	307	1,727	17.78
1945	250	1,493	16.75

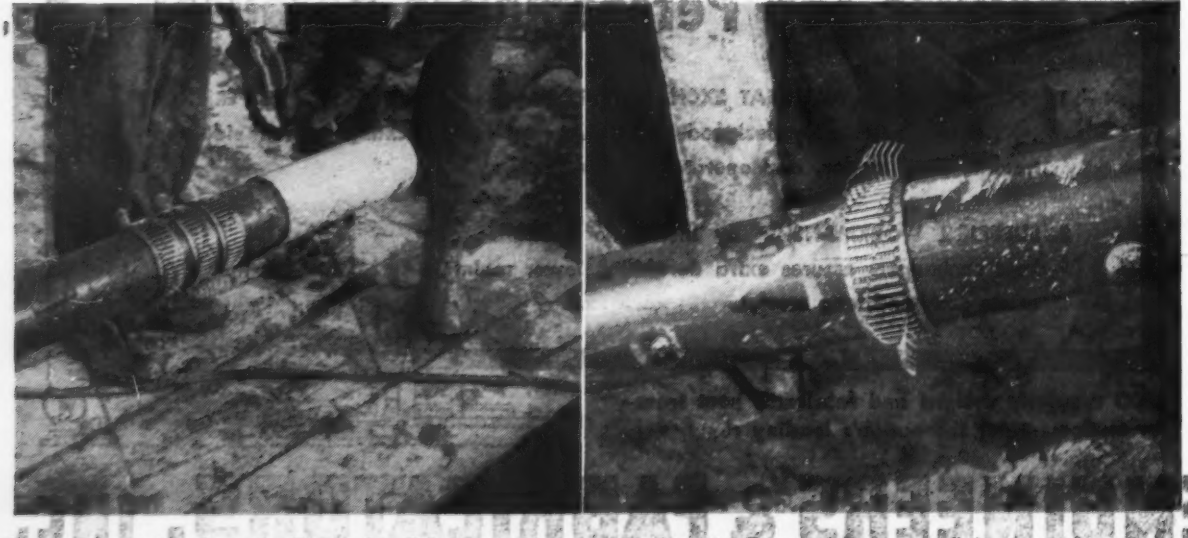


Fig. 1.—View at left shows installation of wall-cleaning guides on casing-shoe joint. View at right shows wall-cleaning guide on casing. Note welded lugs to permit 14-in. travel of guide on casing

between the upper sand and the sand to be completed below the oil string has always made the cementing of casing strings in multiple-sand wells a difficult problem in the southeastern part of the basin. Obviously, the thicker, the more numerous, and the closer such water sands lie to the window and the greater the distance between the window and casing shoe, the more difficult it becomes to obtain a satisfactory primary cement job.

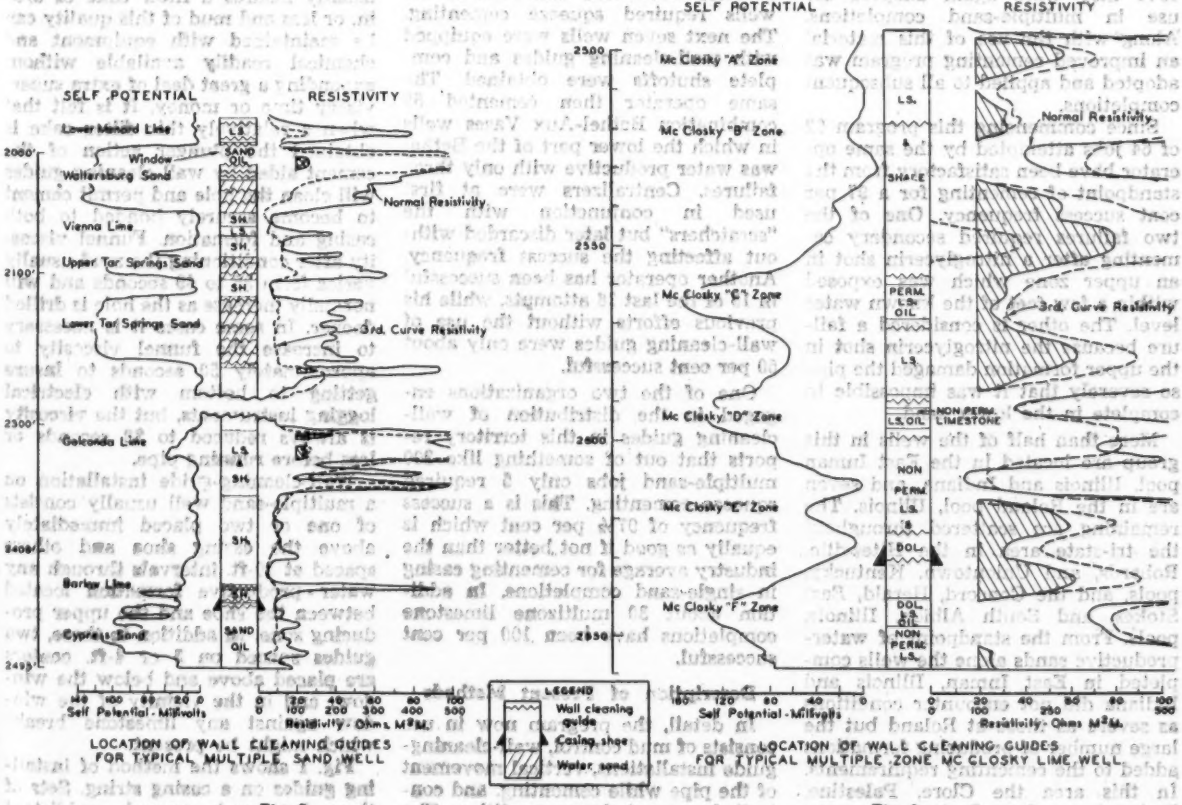
The problem first became acute in the New Harmony Consolidated pool. In order to combat this condition one operator at New Harmony adopted the practice of working the pipe while cementing with rather encouraging results. Another operator in the same general area attempted to cement 10 wells for multiple-sand completions using conventional methods and suffered 5 failures for a 50 per cent success frequency. After experimenting with such practices as enlarging the hole in the vicinity of the window and working the pipe while cementing, this operator finally ran several oil strings equipped with wall-cleaning guides or "scratchers." This type of equipment while relatively new to the basin has been used successfully in other parts of the country for several years.

As a result of the above experience the use of wall-cleaning guides and vertical movement of the casing while cementing became a uniform practice and finally a mud-control program was inaugurated by this operator. After adopting this procedure, 18 multiple-sand wells located in the Roland and East Inman pools, Illinois, and the Mt. Vernon pool, Indiana, were completed during the latter part of 1941 and the early months of 1942. The upper sands in 6 of these wells were completed through open windows and the remaining 12 by gun perforating; 17 of the 18 were successful to establish a success frequency of 94 per cent. In the wells completed at East Inman and Mt. Vernon water occupies the lower portion of the Waltersburg sand which occurs approximately 400 ft. above the Cypress sand and a relatively thick water-bearing Tar Springs sand lies between the two oil-productive horizons. Although the conditions here are not as severe as at Roland where the Waltersburg at a depth of 2,150 ft. must be completed 750 ft. above the Aux Vases, an excellent cementing job is required to exclude water.

From the latter part of 1942 until March 1944 the alloy casing material required for conventional multiple-sand window completions was not available and it was necessary to use various types of back-off tools or steel casing mills to obtain open windows opposite upper productive horizons. Because of the hazards attending the use of backoff tools, it was considered desirable to discontinue the use of wall-cleaning guides and this was accompanied by a sharp drop in the success frequency of multiple-sand completions. Twenty-one wells were completed by one company during the period and only 11, or 52 per cent, were considered successful.

In seven of the wells the upper zone was exposed by gun perforating, and 14 had open windows made by using backoff tools. None of the practices embodying mechanical centralization and vertical movement of the pipe was attempted on nine of these jobs, but spring centralizers were used above and below the windows and the casing was spudded while cementing the other 5 back-off tool completions.

Centralizers were also used on some of the wells completed by gun perforation without affecting the success frequency appreciably. The mud-control program remained unchanged during this period but the use of backoff tools requires a certain degree of cement contamination before cementing the upper string and the full benefit of mud control is, therefore, not realized. In the group of 18 wells on which guides were used, 12 were completed by gun perforation with only 1 primary cementing failure. Of the 21-well group in which guides were not used, 7 were opened by gun perforation and 4 were failures. Thus, in the one group utilizing



LOCATION OF WALL CLEANING GUIDES FOR TYPICAL MULTIPLE SAND WELL

Fig. 2

LOCATION OF WALL CLEANING GUIDES FOR TYPICAL MULTIPLE ZONE MC CLOSKY LIME WELL

Fig. 3

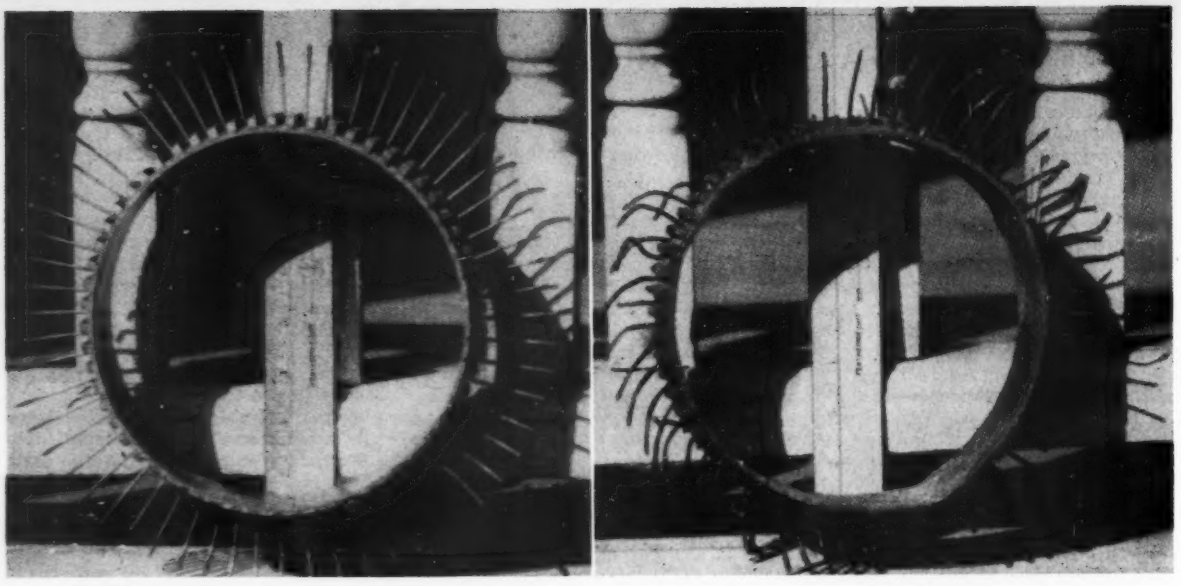


Fig. 4.—View at left shows a new wall-cleaning guide. That at right shows guide removed from casing after running in well

guides and mud control the success frequency was 92 per cent. In the other utilizing mud control, and to some extent casing centralizers, but no wall-cleaning guides the success frequency was 43 per cent.

The use of the various tools was of value in that the poor results clearly demonstrated the desirability of cementing in one continuous operation. Hence, immediately after restrictions on the use of alloy casing sections were lifted during the early part of 1944 they were again adopted for use in multiple-sand completions. Along with the use of this material an improved cementing program was adopted and applied to all subsequent completions.

Since commencing this program 62 of 64 jobs attempted by the same operator have been satisfactory from the standpoint of cementing for a 97 per cent success frequency. One of the two failures required secondary cementing after a nitroglycerin shot in an upper zone which was exposed within a few feet of the known water level. The other is considered a failure because the nitroglycerin shot in the upper formation damaged the pipe so severely that it was impossible to complete in the lower sand.

More than half of the wells in this group are located in the East Inman pool, Illinois and Indiana, and seven are in the Roland pool, Illinois. The remaining are scattered throughout the tri-state area in the Hitesville, Robards, and Uniontown, Kentucky, pools, and the Concord, Herald, East Stokes, and South Albion, Illinois, pools. From the standpoint of water-productive sands alone the wells completed in East Inman, Illinois and Indiana did not encounter conditions as severe as those at Roland but the large number of producing formations added to the cementing requirements. In this area the Clore, Palestine, Waltersburg, Tar Springs, Cypress, and Aux Vases sands are productive; a few of the wells are completed in four zones and several are open in three zones.

In the Albion pool, Illinois, the experience of one operator in successfully completing its first two multiple-sand wells soon led to the adoption of a similar program by another company. This second operator's first six wells were completely successful. On the next two the guides were omitted but in one case spring centralizers were used and both of the wells required squeeze cementing. The next seven wells were equipped with wall-cleaning guides and complete shutoffs were obtained. The same operator then cemented 58 combination Bethel-Aux Vases wells in which the lower part of the Bethel was water productive with only three failures. Centralizers were at first used in conjunction with the "scratchers" but later discarded without affecting the success frequency. Another operator has been successful in 15 of the last 16 attempts, while his previous efforts without the use of wall-cleaning guides were only about 50 per cent successful.

One of the two organizations engaged in the distribution of wall-cleaning guides in this territory reports that out of something like 200 multiple-sand jobs only 5 required squeeze cementing. This is a success frequency of 97½ per cent which is equally as good if not better than the industry average for cementing casing in single-sand completions. In addition about 30 multizone limestone completions have been 100 per cent successful.

Description of Present Methods

In detail, the program now in use consists of mud control, wall-cleaning-guide installations, vertical movement of the pipe while cementing, and controlled cement-slurry qualities. The drilling-mud characteristics as far as cementing is concerned are no different from those desired for drilling purposes alone. Usually, mud is mixed immediately above the first prospective producing zone. If no productive zones are anticipated at a shallower depth, the mud is ordinarily conditioned to a 15-cc. A.P.I. water-loss index or less near the base of the Pennsylvanian.

In field practice it has been found that this particular water-loss index usually insures a filter cake of 3/32 in. or less and mud of this quality can be maintained with equipment and chemical readily available without expending a great deal of extra supervisory time or money. It is felt that when a relatively thin filter cake is obtained the plunger action of the cement aided by wall-cleaning guides will clean the hole and permit cement to become securely bonded to both casing and formation. Funnel viscosity after conditioning the mud usually varies from 36 to 40 seconds and will normally increase as the hole is drilled deeper. In some cases it is necessary to increase the funnel viscosity to approximately 50 seconds to insure getting to bottom with electrical logging instruments, but the viscosity is always reduced to 38 seconds or less before running pipe.

Wall-cleaning-guide installation on a multiple-sand well usually consists of one or two placed immediately above the casing shoe and others spaced at 10-ft. intervals through any water-productive formation located between the shoe and the upper producing zone. In addition to these, two guides spaced on 3 or 4-ft. centers are placed above and below the window, and in the vicinity of the window against any limestone breaks which might be present.

Fig. 1 shows the method of installing guides on a casing string. Sets of three lugs each, spaced equidistant

TABLE 1—HISTORY OF MULTIPLE-SAND CEMENTING BY ONE OPERATOR
Years 1941-1945

Year	Total No. of Jobs	No. of Successful Jobs	Success Frequency %	Type of Cementing Program
1941	10	5	50	Conventional
1941-42	18	17	94	Mud control, wall-cleaning guides, pipe worked
1942-43-44	21	11	52	Mud control, pipe worked occasionally, centralizers on some wells.
1944-45	64	62	97	Mud control, wall-cleaning guides, pipe worked, cement-slurry weight controlled.

around the circumference are welded to the pipe at points 6 to 7 in. above and below each guide. The pipe may then be moved a vertical distance of 1 ft. without moving the scratchers. The distribution of guides for a typical multiple-sand cementing job is shown in Fig. 2. If a single-sand completion below the casing shoe alone is anticipated the three guides shown nearest the shoe are ordinarily used. However, if there are any prolific water-bearing sands present which might be corrosive to the casing, the guides are placed through this section as they are in the water-bearing sands of Fig. 2. Ordinarily, 10 to 20 guides are required for multiple-sand completions depending upon the number of sands to be opened and the distance from the lower to the upper productive formation. An average 20-guide installation costs approximately $225, including welding time and rig time for the installation. Fig. 4 shows a guide which was run to approximately 2,000 ft., worked for 8 hours, and then pulled. For comparison, a new guide of the same size and type is also shown.

While the hole is being circulated before cementing, the casing string is moved in the derrick through a distance of 20 ft. to 30 ft. The longer stroke is considered to be more desirable but can not always be used because of mechanical restrictions of the derrick and equipment. The casing remains on the casing seat while cement is being mixed but while pumping the plug after the cement has started around the shoe the pipe is again moved through the same vertical distance as rapidly and as long as safety permits. When the pipe begins to lose weight it is spotted on the casing seat and remains undisturbed for the remainder of the job. From 5 to 10 bbl. of water containing 100 lb. of Quebracho are pumped ahead of the cement and the slurry is gradually built up from water to a weight of approximately 14 lb. per gallon. A 3 per cent gel cement is used and the relatively light slurry has been found necessary to prevent excessive pump pressure and to eliminate a tendency for the pipe to stick or pump out of the hole.

Application to Thin Limestone Pays

In certain areas, especially the Hitesville Consolidated pool, Kentucky, the Ste. Genevieve formation may contain as many as seven porous McClosky lime zones. These are relatively thin and usually vary considerably in acidizing characteristics and for this reason, it is very desirable to acidize each zone independently. The distribution of wall-cleaning guides for cementing a typical multiple-zone completion in the McClosky lime is shown in Fig. 3, where only zones "C," "D," and "F" are productive. The exclusion of water is seldom a problem in this type completion, but it is necessary to obtain a sound cement job if selective acidization is to be practiced. From the performance of the respective McClosky zones after acid treatments, it is believed that 100 per cent success has been attained in cementing for 30 multiple-zone limestone completions.

As far as this cementing program is concerned, the only cost not ordinarily required is that of guides and their installation, plus the small amount of chemical used ahead of the cement. Representative drill-stem tests, cores, and electrical logs can be obtained only when mud control is practiced and it is for this reason that mud control for the purpose of cementing is considered to incur no additional cost.

Conclusions

The 97 per cent success frequency experienced by more than 30 basin operators in cementing casing for 200 multiple-sand completions indicates that methods now available permit the completion of wells in more than one zone with about the same success expectancy as wells completed in a single producing zone. The history of multiple-sand cementing by one company operating in this area during the past 5 years clearly defines these methods. As shown in Table 2, the first 10 wells completed by this operator without mud control or guide installations were only 50 per cent successful. Next, 18 wells using mud control, wall-cleaning guides, and pipe movement were 94 per cent successful. Then, 21 wells completed either by backoff tools or gun perforations but without wall-cleaning guides in either case were 52 per cent successful. Finally, the last 64 multiple-sand wells completed under the present program were 97 per cent successful. In addition to the multiple-sand completions, 30 McClosky lime zones have been cemented for completion above the casing shoe with 100 per cent success.

The current success frequency and the earlier satisfactory results obtained by means of similar methods leave little doubt that, in this territory at least, successful multiple-zone cementing can be achieved by a program which includes drilling-mud control, application of wall-cleaning guides, vertical movement of casing, and control of cement-slurry qualities. In addition to eliminating squeeze-cement jobs for the purpose of shutting off leaks occasioned by cement channeling, it also has been found that the marked reduction in frequency of collapsed pipe following nitroglycerin shots is sufficient to indicate that this problem is closely related to successful cementing. The cementing technique described is, of course, not represented to be a procedure which will eliminate all well-completion problems, but the results obtained to date have been most encouraging in their influence upon other phases of well-completion work.

Secondary Recovery Engineering

(Continued from page 95)

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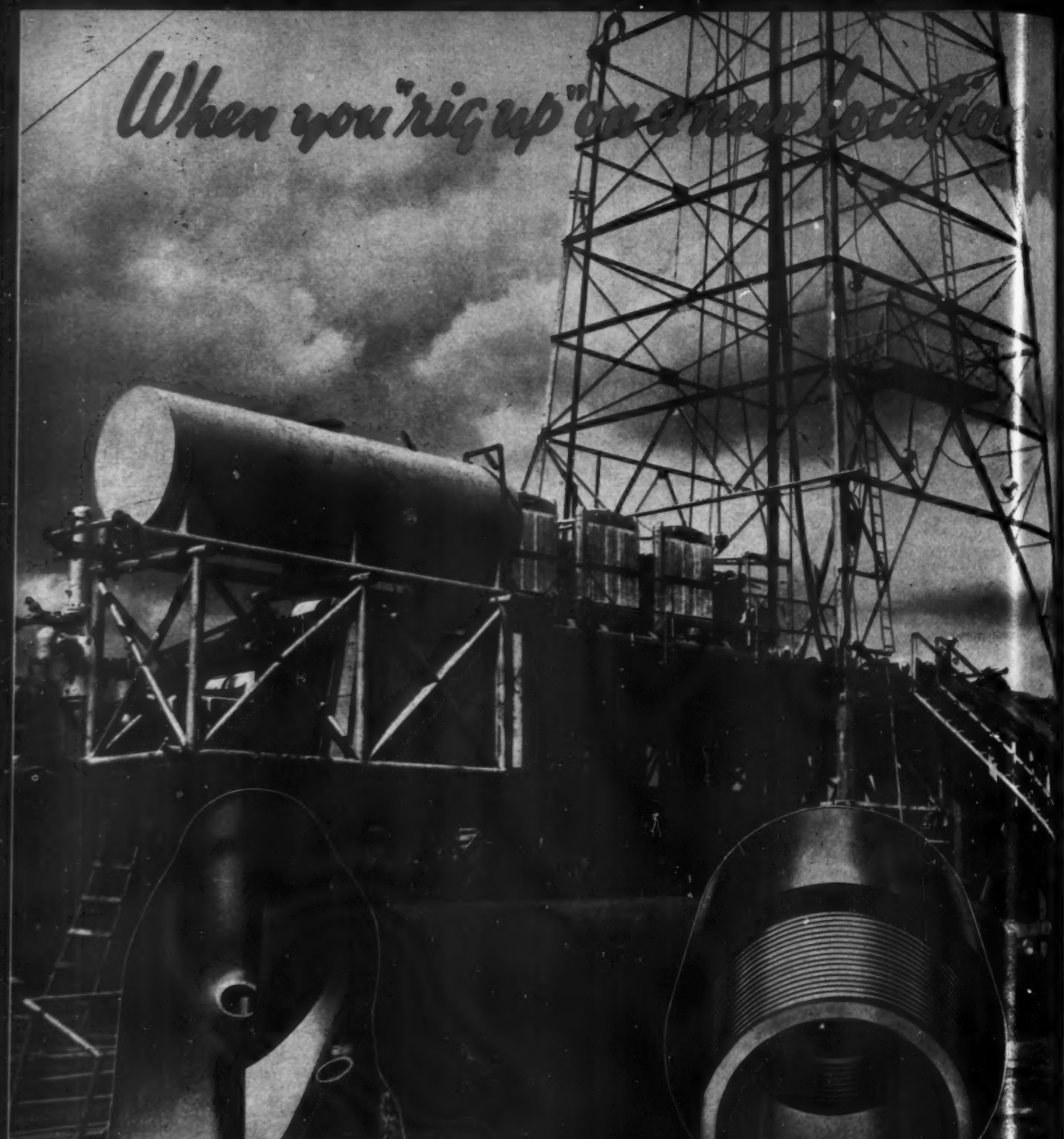

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PROGRESS IN METALS

by W. L. Nelson
Consulting Engineer

Steel Inadequate for Really High Temperatures

REQUIREMENTS of industry for alloys that can withstand temperatures of 1200°-1800° F. (730°-1060° C.) are not being satisfactorily met by any alloy steels. True, castings containing in excess of 18 per cent chromium and 8 per cent nickel are being used for tube and boiler supports but these materials are expensive and their mechanical properties are inadequate for wrought materials unless the carbon content is exceedingly low. All of this leads to the conclusion that steel will probably never be satisfactory for extreme high temperature service because of the transformations that take place at about 700° C. on the iron carbon diagram, and that even iron cannot be used as a main component because of its extreme tendency to oxidize or rust at elevated temperatures. Although certain intermetallic compounds of iron are more stable than carbides at elevated temperatures, the difficulty with oxidation persists. Columbium in the amount of 1.9 per cent in iron produces an alloy that gains in strength between 900 and 1150 C. (1652°-2102° F.), and undoubtedly other metallic compounds can be developed. The behavior of columbium alloys was investigated by D. W. Rudorff in Metallurgia, Vol. 26, p. 193, 1942, and was discussed on this page in the May 6, 1943, issue of The Oil and Gas Journal.

The use of nickel and chromium in steel in large amounts is necessary if much improvement is desired in high temperature properties but not until substantially all of the iron has been displaced are really good materials obtained. This leads to alloys high in nickel as the best type of material now available. Chromium is perhaps the most satisfactory element for use with nickel but small amounts of copper, iron, zinc, etc., can be tolerated. Manganese, tungsten, cobalt, etc., do not seem to be harmful but their effects are not clearly understood. Fundamentally it seems that nickel is a logical base material for extreme-high temperature alloys but no way has been found to produce nickel cheaply nor has a single hardening element similar to the use of carbon in iron in making steels been found for the hardening of nickel.

Needless to say the development of 1200°-1800° F. alloys on a large scale and at a reasonable price would introduce a new age of chemical manufacture. Such alloys are needed in the petroleum industry, the chemical industry, and in the construction of gas turbines or other high-temperature engines.

Production Welding

THE increasing importance of production welding is so well stated by R. D. Warrerman of Eutectic Welding Alloys Corp. that his recent editorial in the Eutectic Welder is in part reproduced here.

Welding has advanced a long way since the days when it was used merely as a repair or maintenance tool. Forge welding was originally the only widely known method but today there are many different welding processes. The savings and improvements brought about by the new welding processes have made welding a most important tool, not only for maintenance and repair, but also for production purposes.

As is usually the case, wartime necessities act as a catalyst for production processes. So was the case with welding. Production had to be accelerated—welding proved to be the necessary "shot in the arm." Engineers and designers adopted it very readily. They found that it solved many of their pressing problems.

Furnace and induction heating methods of joining metals with low-temperature welding alloys has proved to be an excellent combination. Manufacturers find that simple, easily produced combinations can be joined rapidly to form strong parts by this method. And surprisingly enough, not only time is saved, but many other economies are effected. Initial or capital investments, which may have been considered large, were found to be surprisingly small when spread over the large number of parts that were fabricated. Of particular importance is the fact that a very small amount of joining alloy is required, particularly with alloys of the thin-flowing type. In addition, greater strengths are obtainable than with materials such as silver solders.

Production welding has come into its own. Manufacturers who are slow to recognize this fact will find themselves unable to compete with the more forward-looking concerns.

Metallurgical Terms

Process Annealing

This type of annealing may be defined as heating to a temperature below or close to the lower limit of the critical range of the iron-carbon diagram followed by slow cooling.

Synthetic Rubber for Oil Machinery

FIVE basic types of synthetic rubber are used for machine parts. Buna S is similar in processing and performance to natural rubber. It can be vulcanized with sulfur and cured to hard rubber. Its resistance to deterioration in air at room and elevated temperatures is considerably better than that of natural rubber. It is widely used for electrical-cable insulation as a result of its excellent electrical properties. Buna S is also suitable for water-pump seals and gaskets, but not for oil equipment.

Buna N resembles Buna S in regard to vulcanizing and curing properties. It has outstanding resistance to oil and good breakaway properties in contact with metals. Buna N is satisfactory for oil and gasoline hose, packings, gaskets, rubber covered rolls, valve inserts, molded dust seals, diaphragms for hydraulic gear shifts, hydraulic lines, and vibration dampeners.

Neoprene is a general-purpose synthetic rubber with good resistance to chemicals and oils and excellent resistance to heat, air, and light. Although its electrical properties are lower than those of natural rubber, it is used for the outer sheathing of electrical insulation due to its flame resistance. Typical applications of neoprene include oil-resistant hose, beltings, gaskets, fuel cells, solid truck tires, airplane tires, printing rollers, and airplane hull and wing caulking.

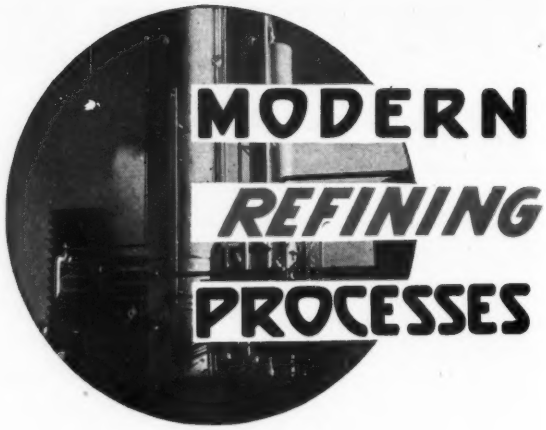
The processing of butyl is similar to that of natural rubber, but a longer curing time is required and it cannot be vulcanized to hard rubber. The physical properties are lower than those of natural rubber, but the general resistance to deterioration is good. Its resistance to oxidation and acid are very good. Butyl is used in acid-handling equipment, inner tubes, and other applications where its impermeability to gases and resistance to chemicals and oxidation are important.

Thiokol has excellent resistance to oils, greases, solvents, ozone, sunlight, and natural aging. Its resistance to aromatic hydrocarbons and aromatic blended gasolines is better than that of natural rubber or any of the other synthetics. It is used where resistance to deterioration is more important than physical properties. Typical applications include paint spray and solvent hoses, selector valve rings, diaphragms, cable covers, and tank linings.

Abstract taken from March 1946 issue of Materials and Methods of a paper in Machine Design Vol. 17, Dec. 1945, p. 116.

Refinery Losses

. . . . where they are, and how to reduce them



by George Armistead, Jr.

THE disappearance or escape of hydrocarbons which occurs in greater or less degree between the initial receipt of crude and the final shipment of finished products, while generally small in percentage, may represent important dollar value to the refiner. Usually the maximum recovery of marketable liquid products is necessary for maximum refinery earnings. The theoretically obtainable liquid recovery in a given refinery is largely controlled by the processing methods employed, since many of the extensively used processes such as cracking, polymerization, and alkylation change the phase and density relationships from the liquid-volume basis prevailing in a simple distillation operation. The actual escape of petroleum in the course of refinery processing is, however, unrelated to the processing employed and is always a matter for independent consideration. It is this problem, generally referred to as refinery loss, with which this article is concerned.

Fig. 10-1 indicates diagrammatically the principal avenues for refinery losses. In general, such losses may be classified as:

1. Evaporation and other escape into the atmosphere.
2. Loss through plant-water effluent.
3. Miscellaneous losses such as incomplete emptying of tank cars, acid sludge losses, etc.
4. Loss through leakage into the soil.

There are, in addition to these, a class of losses which may be termed "economic" losses in which mixing of some high-value product into a low-value product unintentionally occurs, such as the leakage of gasoline into fuel gas. While the actual escape of hydrocarbons has not occurred, the economic effect is almost the same.

NO. 10 IN A SERIES

BASIC requirements for control of refinery losses are the provision of a continual routine check to find such losses and of adequate means for making detailed investigations when necessary. Any excessive losses which may be indicated by such checks require complete investigation which requires the use of instrumentation tankage, and analytical facilities needed for making weight balances. Over-all unaccounted-for refinery losses should not exceed 1 per cent.

Weight Balances

In most refineries, the ready identification of refinery losses is hindered by the phase and density relationship changes in oil during processing, as mentioned above, which makes a simple check between input and output volumes of no great significance. It is consequently necessary in most cases to employ weight balances in order to account for the products concerned. The weight balance is the chief tool in the investigation and identification of refinery losses and while it is somewhat cumbersome, it is the only fully reliable method.

In operations where volume changes occur, such as in cracking, large losses may remain unnoticed indefinitely if weight balances were not made. On the other hand, weight balances are concerned chiefly with accounting for total products and are of only limited use in connection with individual products which are generally valued on a volume basis. Some volume balance methods, as described by McClintock and Piroomov[a], with empirical corrections relating them to weight balances, have been used for control purposes, but do not furnish a fully accurate check on losses. The weight balance shows only the extent to which total input to a given system is accounted for, and it does not indicate the avenue of any loss or losses thus detected, although pointing out the magnitude.

For the location and correction of losses indicated by the weight balance to exist, it is necessary to subdivide the system and check into all the phases involved, such as accuracy and consistency of measurements, correctness of analyses of product streams, possible leaks, handling irregularities and the like. Weight balances may be applied to groups of equipment ranging from a whole refinery to a small subdivision of a processing unit, and covering time periods which may range up to a month's operations. The shorter periods are generally less accurate, for which reason, comparatively long test periods are to be preferred. In the smaller plants it is sometimes convenient to make over-all refinery weight balances, whereas in the larger ones, this is usually impractical, and it is necessary to subject the individual operations or small sections to such study. Table 10-1 shows a typical weight balance made up for a month's operations of a small refinery employing thermal and catalytic cracking and alkylation.

Where Loss Occurs

Various avenues of loss are common to all refineries, as is indicated in Fig. 10-1, and must be guarded against throughout. These chief sources of loss are discussed in the following.

Unloading and loading losses.—

TABLE 10-1—TYPICAL OVER-ALL MONTHLY REFINERY WEIGHT BALANCE
(5,000 Bbl. per Day Refinery)

Stocks—	°A.P.I.	Lb./bbl.	Inventory first of month		Receipts or charge		Shipments		Inventory end of month	
			Barrels	Pounds	Barrels	Pounds	Barrels	Pounds	Barrels	Pounds
1. Crude	35.6	296.14	13,450	3,995,000	29,600	8,737,503	.....	.....	12,010	3,570,000
2. Straightrun motor gasoline	62.3	255.28	.....	.....	14,225	3,631,358	.....	.....	.....	.....
3. Straightrun naphtha	57.9	261.20	602	157,242	12,156	3,175,147	.....	.....	277	72,352
4. Natural gasoline	80.2	233.65	.....	.....	3,264	762,634	.....	.....	.....	.....
5. Straightrun aviation gaso.	71.7	243.43	1,449	352,730	1,311	319,137	.....	.....	449	109,300
6. Debut. gasoline inventory	58.0	261.07	2,761	720,814	.....	.....	.....	.....	3,361	877,456
7. Depent. gasoline inventory	56.4	263.34	1,310	344,975	.....	.....	.....	.....	1,120	294,941
8. Butane-butylene	...	206.43	5,082	1,056,548	25,333	5,192,252	.....	.....	4,761	989,812
9. Normal butane inventory	...	204.54	268	55,085	.....	.....	.....	.....	1,807	371,411
10. Isobutane inventory	...	199.08	2,256	449,124	.....	.....	.....	.....	2,966	590,471
11. Isopentane inventory	...	217.98	780	170,024	.....	.....	.....	.....	688	149,970
12. Light alkylate	69.4	246.25	3,861	950,771	.....	.....	4,604	1,133,735	8,408	2,070,470
13. Alkylate bottoms	51.0	271.05	226	61,470	.....	.....	.....	.....	340	91,820
14. Gas oil	30.1	306.22	21,654	6,630,022	57,789	17,693,836	231	70,728	15,008	4,595,149
15. Reduced crude	19.4	327.98	223	73,140	.....	.....	9,258	3,036,439	525	172,190
16. Catalytic cracked gasoline	58.1	260.95	1,897	495,022	.....	.....	.....	.....	1,929	503,373
17. Fuel gas	...	141.12	.....	.....	.....	.....	34,221	4,829,268	.....	.....
18. Cat. cracked gas oil (lt.)	30.1	306.22	1,109	339,598	.....	.....	11,288	3,456,611	7,771	2,379,636
19. Catalytic cracked naphtha	43.9	282.07	1,310	369,512	.....	.....	.....	.....	1,761	496,725
20. Slop (est.)	56.0	263.76	133	35,080	.....	.....	.....	.....	189	49,851
21. Motor gasoline blend	58.4	260.53	23,928	6,233,962	.....	.....	36,250	9,450,000	14,424	3,757,885
22. Fuel oil—Cat. cracked	22.2	321.97	.....	.....	.....	.....	7,293	2,348,127	.....	.....
Th. reformed	16.8	333.73	.....	.....	.....	.....	314	104,791	.....	.....
23. Aviation gasoline	67.6	248.47	22,530	5,632,500	.....	.....	48,000	12,000,000	32,050	8,020,000
				28,122,619		39,511,867		36,429,699		29,162,812

When it is possible to compare the volume of oils received from tank cars, barges, ships, and other forms of transportation with the measured amount delivered from such transportation, appreciable losses are sometimes brought to light. On some occasions, these result from failure fully to empty a vessel or car, and while not an actual escape of material, it may have that effect for the refiner. In other more frequent instances, such losses result from imperfect technique in handling the transfer from transportation to refinery storage, as in the case of light hydrocarbons and natural-gasoline tank cars, which latter requires special procedures.[4] In other cases it may arise from excessive evaporation losses resulting from the delivery into refinery tankage, or leaks. In the receipt of ship and barge cargoes and regular tank-car shipments of crude, gasoline, and similar oils, the checkup on losses is a simple comparison of volume and is a matter of routine in most organizations. The routine checking of light hydrocarbons and natural-gasoline receipts is a more difficult matter and may sometimes be neglected unless the possibilities of loss through this channel are fully recognized. Sufficient tankage and adequate facilities for checking receipts against deliveries on all products are almost indispensable. While the smaller deliveries, such as a single tank car, are hard to check, the appearance of a consistent loss furnishes the basis for study to locate its source and correction.

The loss of hydrocarbons in the actual loading of tank cars, barges, ships, etc., with oils below 10 lb. R.v.p. are usually quite small and while some evaporation does occur, it has been found generally difficult to justify gas collecting equipment in connection with a tank car loading. In the case of light hydrocarbons, particular techniques have to be applied both from the standpoint of safety and the avoidance of losses.[5]

	Pounds
Inventory, end of month	29,162,812
Inventory, first of month	28,122,619
Difference (increase)	1,040,193
Net production	36,429,699
Total production	37,469,892
Coke formation (cat. cracking)	1,321,425
Total	38,791,317
Charge	39,511,867
Loss	*720,550

*Equals 1.82 per cent of input.

Line and vessel leaks.—Leaks in transfer and processing lines and from various types of vessels are a recurring source of loss from the entrance of petroleum into the refinery to its final shipment. Leaks in underground lines are likely to develop from various causes, such as corrosive soil conditions, corrosion from products and chemicals, and failures of pipe and fittings. Such leaks can easily go unnoticed and except in the case of very heavy stocks, many soils have the ability to absorb large quantities of oil lost by underground line leakage. One instance has been reported where such leakage over a long period was sufficient to permit some small-scale commercial operation on property adjoining the refinery site for recovery of oil seeping from the soil. A considerable amount of such underground leakage will usually show up in the plant drainage system and the oil trap system must be adequate for its recovery.

The detection of leaks in underground lines is greatly facilitated by such routine accounting as can be carried on with respect to deliveries and receipts in plant pumpings, which will show unusual losses in transfer of oil from one section to another, thus indicating a loss either into the ground or through valve leakage into some other connected system which may represent an important "economic" loss. Any underground transfer lines suspected of such leakage can be blinded and hydrostatically tested to establish how well they hold pressure, which indicates the extent of existing leaks. By this method, some leaks can be detected in their early stages and many of importance can be traced down, although this is not always an easy matter.

Leakage from process lines and other aboveground piping and from tank connections is usually apparent and easy to detect. One class of exceptions, however, are connections of processing units and pressure storage to safety relief and emergency blowdown systems which in some cases may be very difficult to identify, as in the case of light hydrocarbons. All of the connections to such blowdown systems should be examined periodically and any leakage on the hot vessels can readily be detected by temperature, while on the cold ones reliance generally must be placed on conditioning of the pressure relief and blowdown valves.

Condensing and cooling equipment.—The two chief sources of loss originating in condensing and cooling equipment comprise (a) leaks, and (b) inadequate cooling resulting in evaporating losses on light products. All water-condensing and cooling equipment is subject to a certain amount of corrosion from the water as well as on the oil side. Where the oil-side pressure is the higher, the oil is naturally discharged through any leaks into the flowing water stream and is finally carried through the

plant mains, ditches, or flumes to the cooling tower or oil trap. In the case of gasoline leaks there are usually no severe effects and large losses can go for considerable periods unnoticed unless routine checks are made to detect them. Among such checks is the periodic examination of water samples leaving operating units to detect any possible oil inclusions, and the observation of the discharge of closed systems into the cooling tower or sump where the presence of oil and particularly the lighter hydrocarbons may be noticeable. The discharge of the light hydrocarbons including motor gasoline into a warm cooling water system results in the evaporation of the product as well as an important fire hazard in some cases. The leakage of heavy oils from condensing and cooling equipment is much more readily detected than that of gasoline and loss of such products may be comparatively small. In the case of condenser sections installed below a cooling tower, leakage of gasoline is usually difficult to detect and the chief reliance must be placed on periodic inspection and tests of the condenser sections. It is desirable that shell-and-tube equipment operating with pressures on the oil side above that on the water side should have bleeders on the water-discharge lines for checking leakage from the oil side. Inadequate or badly fouled condensing and cooling equipment results in high temperatures of rundown and storage tanks which is naturally conducive to increased evaporation losses.

Evaporation losses.—Evaporation of gasoline, crude, and other high-vapor-pressure stocks in atmospheric storage is an important source of loss, as has been defined by the extensive literature on this subject.[3,4,6,7,8] One of the primary factors in tank evaporation losses is the type of atmospheric storage employed and the kind of gas collection system, if any, provided in connection therewith. Floating-roof tanks are subject to minimum evaporation and ordinary cone-roof tanks to the greatest amount of evaporation, with the breather and balloon types intermediate between the two and being mainly useful on stationary, full storage. The principal factors affecting evaporation losses from atmospheric storage tanks are:

1. Vapor pressure of tank liquid. This is, of course, affected by the properties of the oil, entering temperature, atmospheric temperature, and type and condition of the tank paint.
2. Frequency of emptying and filling.
3. Average oil level.
4. Miscellaneous atmospheric factors, such as wind velocity and variation between high and low daily temperatures which affect the extent of "breathing" of the tank.

As indicated in the foregoing, it is desirable that process streams of more volatile hydrocarbons be cooled to the maximum extent permitted by plant cooling water temperature as a means of reducing evaporation. In the hotter climates, water cooling of cone roof tank, roofs and shells is sometimes practiced to reduce the effect of atmospheric variations and is in some cases thought to be justified.[4] Losses are increased by frequency of emptying and filling tanks as is well recognized and are related to the average relative amounts of air and liquid oil present in the tank. Much turnover of stocks in tankage is unavoidable such as in shipping, blending and rundown gasoline storage. According to the data published by Larson, the filling losses alone, of 10 lb. absolute vapor-pressure gasoline in atmospheric storage would be about 0.3 per cent of throughput. For tanks which are constantly being filled and emptied, the floating roof provides an effective means of combating evaporation, since such a tank has substantially no vapor space and the main evaporation which can occur is

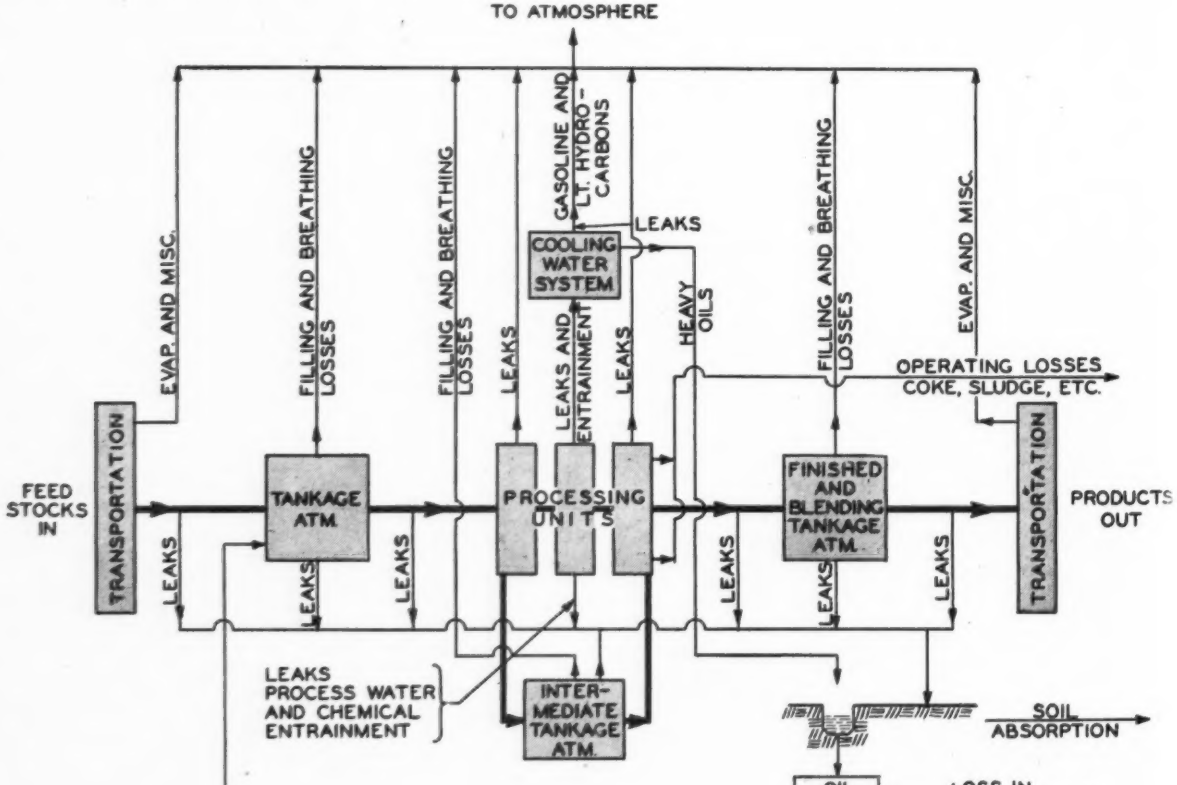


Fig. 10-1—Sources of refinery losses

around the sealing edge of the floating roof. In addition to the reduced loss, the floating roof may have substantially less fire hazard for the same reason and while there are reported instances of ignition of the escaping vapor in the seal area, the consequences are in some cases reported far less serious than in a cone roof tank where a combustible vapor in the vapor space has been ignited.

The agitation of gasoline with air in tankage, or any other container, is an undesirable practice both from the standpoint of evaporation losses and the development of dangerous combustible mixture and static electrical charges, and mixing can usually be affected by the proper types of mechanical mixers such as are in wide use. Proper condition and operation of tank fittings provided for the venting during filling or emptying of tank contents are important both from the standpoint of preventing evaporation losses and safety. For natural gasoline and other hydrocarbon mixtures which would boil in an atmospheric pressure tank, the only satisfactory provision is pressure or refrigerated or the combination of the two. Unless some such provisions are made, the evolved vapor losses from such storage are very high.

Processing losses.—Processing losses include both avoidable and unavoidable losses of petroleum in course of processing. Among the more or less unavoidable losses are the formation of carbon in cracking and the formation of sludges in acid treating, although such losses are usually readily identifiable and measurable. The avoidable losses include, for example, the inclusion of hydrocarbons in water streams drawn from treaters, excessive carryover of hydrocarbons into barometric condensers on vacuum units and the formation of emulsions which are not readily separated by the oil trap system. The process units are also subject to the previously mentioned "economic" losses, such as where gasoline may get into the fuel gas system or high value materials get into residual fuel oil. Losses of this class merit as much attention as those involving an actual disappearance of hydrocarbons.

The basic requirement for the control of refinery losses and the maintaining of the maximum economic liquid recovery, is the provision of a routine continual check on possible losses and the provision of adequate means for making such detailed investigations, as are indicated as necessary. It has been pointed out by McClintock and Piroomov that the maximum value should be obtained from the daily volumetric yield statements in terms of loss for which purpose they provide an "anticipated recovery" figure to indicate any possible large variations from reasonably expected recovery. Any indicated excessive losses determined by this or other methods naturally require full investigation, and this in turn requires the instrumentation, tankage, and analytical facilities mentioned in the foregoing for making weight balances. The setting up of weight balances on individual process units requires adequate measurement facilities, including tankage and meters as well as accurate average data on tank temperatures and samples and detailed analyses on light hydrocarbons and gas streams. It is generally recognized good practice on modern refining installations to include adequate measuring facilities of this sort. With the complexity of modern processing, such provisions for hydrocarbon recovery are indispensable for most profitable refinery operation and have been found soon justified. Under proper supervision and with adequate facilities, the over-all unaccounted-for refinery loss (exclusive of coke, sludge, etc., which is accounted for) should not exceed about 1 per cent, and an individual unit should be somewhat lower.

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Antivenin Serum for Snake Bites

by Henry W. Boggess*

VENOMOUS snakes are native to most oil-producing areas in the United States. Scouts, geologists, roustabouts, pumpers, meter men, seismograph and drilling crews, as well as many other oil-field workers are exposed to snake bite. Many men have great fear of poisonous snakes and insist upon wearing protective boots or leggins and also carrying snake-bite kits.

It should be realized that there are only three kinds of poisonous snakes within the United States:

1. Rattlesnake.
2. Cotton-mouth moccasin.
3. Copperhead (also a moccasin).

There is the possible exception of the coral snake in the extreme southern parts of this country.

It is a rare occasion when oil-field workers are bitten by a poisonous snake even though the West Texas area abounds with diamond-back rattlers, the East Texas area has great numbers of copperheads and cotton-mouth moccasins, and many other sections have above-average infestation of one or more of the three. Of the few who do sustain bites, it is seldom that the bite proves fatal.

There can be no argument against the use of protective footwear and none need be made against the carrying of snake-bite kits, except that experience teaches that of the thousands of snake-bite kits furnished to workmen each year by oil companies, only a small per cent of these kits are actually carried on the person each and every time snake "territory" is invaded.

Every person working in areas known to be infested by poisonous snakes should always carry with him a small pointed and sharp knife and also some matches. Immediately after a bite, a tourniquet should be applied near the bite and between the bite and the heart. A belt, handkerchief, piece of shirt, necktie or other piece of clothing will make a good tourniquet. A knife blade should be sterilized by holding it in the flame of a match and the points where fangs have broken the skin should be lanced. The point of the knife blade should be inserted as deeply as the fangs penetrated for the purpose of inducing drainage and the cut should be in line with and not crosswise of a muscle. If possible, suction should be applied to the wound. Suction by mouth, where possible, is considered safe provided there are no open lesions in the mouth.

As soon thereafter as possible, the bitten person should be given Antivenin serum by a doctor.

*Superintendent of personnel department, Sinclair Prairie Oil Co.

Safety manual which includes suggestions from employes in all departments of its East River Works, is presented to Wilbur F. Burt, vice president in charge of manufacturing, Socony-Vacuum Oil Co., Inc., by delegation of three veteran employes. Selected by their fellow-employes because they represent 102 years of employment in the company without a disabling injury, they are: Herman Rauch, technical service laboratories; James Hart, Socony paint products, and Thomas Lynch, Blissville Cooperage. Next are Burt, and Theodore C. Travis, safety supervisor of East River operations

Employes Contribute Suggestions To Refinery Safety Manual

by Fabian R. Staley

AT a series of safety conferences conducted with superintendents, foremen, and assistant foremen of the East River operations, Socony-Vacuum Oil Co., Inc., it was decided that a safe-practices manual for all employes was a necessity, and further, that employes actually doing the job were in position to make the major contribution to it. All of the 1,500 employes at the East River, New York City, works of the company had an opportunity to submit suggestions for the new safety manual. About 1,000 employes responded to a questionnaire and 500 of their suggestions are included in the manual.

All types of work in the refineries are covered in the 110-page book, and principles of safety as applied to laboratory work as well as office are included. The contents are divided into: (1) General Safe Practices, (2) Protective Equipment, (3) Tools and Machinery, (4) Departmental Safe Practices.

Responsibilities of Those in Charge

The responsibilities of those in charge are complete, and in this manual are outlined in general under four headings—Specific Responsibilities, New Installations, Specific Safety Responsibilities of Operating Foremen, and Specific Responsibilities of Mechanical Foremen.

Specific responsibilities.—Those in charge should set an example in knowing and observing all safety rules and precautions. Safety specifications are to be applied to any proposed changes in equipment, plant, product, tool, or material including handling and storage. Where necessary specific safety advice is to be obtained.

Each person in charge is responsible for the close application of safety methods and procedures under his direct supervision. He must consider possible hazards and require that safety devices and protective equipment be available and used. By regular and systematic inspections he must observe that all tools, equipment, machinery, and premises are in safe and operative condition.

Each person in charge shall consult with the safety supervisor or the man to whom he reports for detailed instructions regarding methods not covered by specifications. He must know that the safety regulations are understood, that all hazards are eliminated where possible, that platforms, ladders, and other elevated structures and means of ascending or descending are in a safe condition; that all means of egress, exits, stairways, and similar means of escape, are clear, workable and thoroughly fixed in the minds of his men. Constant alertness is to be maintained to prevent accidents due to weaknesses in equipment or materials, incorrect operations, or hazards of any nature.

Each person in charge must satisfy himself that the men under his supervision are competent, properly attended, and their safety checked. Men working alone in isolated locations must be contacted with regularly by telephone or other means. Men who fail to show proper regard for safety to themselves or their coworkers are to be given special attention, and if improvement is not shown, a transfer or dismissal is in order. New employes, either by employment or transfer, are to be thoroughly trained in the safe procedure of the work to which they are assigned and are to be double checked to ascertain that such safe procedures are thoroughly understood.

New equipment.—Specifications and drawings for all new installations are to be checked against the requirements of national, state, city and company codes, ordinances, and standards. They are to be discussed with and studied by managers, supervisors, engineers, and safety personnel in order to control operating hazards, eliminate physical hazards to all personnel, and to protect property to the fullest possible extent.

Specific Safety Responsibilities of Operating Foremen

The operating foreman must know his men intimately, as to their qualifications, and must assign them accordingly. He is responsible for their competency and their training for the work they are to perform. Failure to understand instructions and lack of knowledge of the job rank high as causes of catastrophes.

Methods should be rehearsed. Procedures, in changeover from one process to another, in new processes, in the use of new chemicals, or in any development work, should be planned with the assistance of the safety supervisor. The procedure of keeping men instructed in the use of personal protective equipment, rescue equipment, and safety devices should be developed with the assistance of the safety supervisor, as should also the instruction of new men, the handling of emergencies, the safety measures to apply where vapors have been released by break or other mishap, the means of exit from buildings, elevated locations, pits, and similar locations.

The operating foremen must cooperate to the fullest extent to prevent hazards in maintenance and to provide for safety measures. Such measures as gas-free tests, burning, weld-

ing, and fire permits, personal protective equipment; the tagging of closed valves, blanking off of pipe lines, checking on acid, caustic, hot oil lines and equipment, determining that pressures are off and equipment drained where necessary for the safety of repair men, the safeguarding of areas adjacent to repair work, the safeguarding of adjacent equipment in operation, of workmen from injury from operating equipment, are all of the utmost importance in the responsibility of the operating foremen, even when responsibility is shared by mechanical supervisors.

In returning repaired equipment back into service, extreme watch must be maintained for any sign of weaknesses, dirty or plugged lines, open drains, unremoved blanks, and any operating indication of danger to equipment or personnel. Makeshift repairs are not to be tolerated.

Extreme care should be taken to see that all grounds and grounding devices are intact and are restored if removed for maintenance of equipment purposes.

Specific Responsibilities for Mechanical Foremen

It is the duty and responsibility of the mechanical foremen to cooperate with the operating supervisors in coordinating work to be done on operating equipment.

The mechanical foreman must know definitely that the operating foreman has been notified and that the equipment has been checked for safety of the mechanical work to be done, before starting such work. He must check with the operating foreman, that lines are clear, valves closed, pressures off, equipment drained, and all precautions taken for the safety of men and equipment. Rules governing gas-free and hot work permits must be strictly complied with.

No one in the mechanical departments is to open or close any valve operating equipment or lines or to perform any operating function at any time, except under the supervision of the operating personnel in charge.

In operating emergencies, mechanical men are to obey orders given by the operating personnel and to cooperate without confusion and excitement.

The mechanical foreman is responsible for the safe condition of tools, the safety of scaffolds, platforms, ladders, or other supports on which men work; the safe loading of hoists, chains, scaffolds and ladders.

He is responsible for the adequate protection and guarding of excavations and unfinished work when left before completion. He is to see that jobs are cleaned up, that guards are replaced, that leftover materials, junk, tools, and equipment are removed to proper places and that the premises are left in a clean condition.

Plant Practices

Engine Exhaust Heats Building

HEAT from the gas-engine exhaust lines in one of the Sinclair-Wyoming plants in the Lost Soldier field has been utilized successfully to heat the plant's compressor building. At present 4 of the 9 units in the plant are arranged to supply heat for the building and before long the remaining units are expected to go into service.

Under winter weather conditions with little or no wind, the present arrangement of 4 units supplying heat will keep the metal building at a comfortable temperature even when outside temperatures are well below zero. However, with high winds blowing the heat loss is too great for the present hookup to supply enough heat to maintain the desired inside wintertime temperatures. Because of this condition work is under way for placing all 9 units in service before early winter.

The drawing, Fig. 1, shows how the heating system operates and Fig. 2 how the ducts are installed. Light gage sheets are used for the ductwork which is flanged on the inside of the building wall to give a watertight joint. The duct likewise is made water tight at the plate on its lower end where it enters the exhaust-line trench. Thin plate or light gage sheet is used for the gate which is cut out for a close fit over the exhaust line. When no heat is desired the gate is removed from the trench and placed over the open end of the duct inside of the building. Natural circulation of hot air is accelerated by the movement of the air caused by the rotation of the flywheel. No blades or vanes were added to the flywheel as the volume of air moved by rotation of the wheel's normal surface was sufficient to deliver fairly high temperature air at the outlet of the duct. This inexpensive installation eliminated the cost of installing and operating one boiler during the winter months.

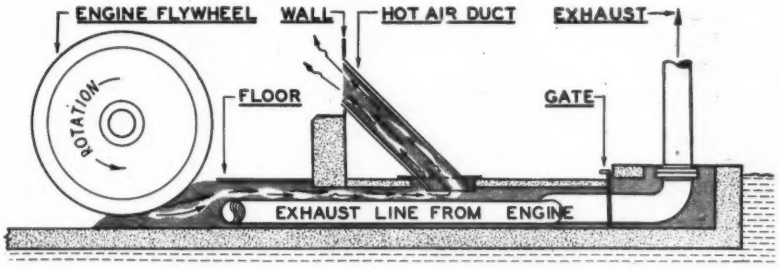

Fig. 1—Longitudinal section through trench, illustrating general scheme of building heating system

Fig. 2—Engine exhaust and muffler installation at Lost Soldier compressor plant showing ducts carrying heat to building

Vaportight CONDULETS

for electrical installations that are exposed to weather, moisture, steam or non-combustible dust

The illustrations show a representative selection from the hundreds of different Vaportight Condulets that are listed in Crouse-Hinds Condulet Catalog 2500. Many other Condulets can be furnished with gaskets that make them Vaportight and Weatherproof.

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Type X Obround Condulet with Vaportight Gasket

Type AHG Vaportight Flexible Fixture Hanger

Type FSC Condulet with Vaportight Gasket

Type FS Vaportight Switch Condulet

Type GSC Condulet with Vaportight Gasket

Type FD Vaportight Switch Condulet

Type GRT Condulet with Vaportight Gasket

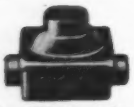
Type FD Vaportight Switch Condulet

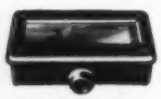
Type C Obround Condulet with Vaportight Switch

Type FS Two-Gang Vaportight Switch Condulet

Type FS Vaportight Triple Switch Condulet

Type FSC Two-Gang Tandem Condulet with Vaportight Switch and Threaded Cap Plug Receptacle

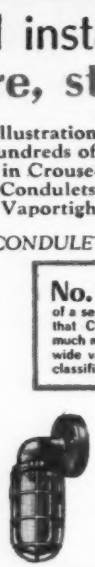

Type FSC Vaportight Push Button Station Condulet


Type FS Vaportight Lighting Fixture

Type FSC Vaportight Plug Receptacle Condulet

Type VPH Vaportight Indirect Lighting Condulet

Type VDB Vaportight Lighting Condulet 500-Watt


Type ARB Vaportight Lighting Fixture for GRF Series Condulets

Type V Vaportight Lighting Condulet for mounting on machines

Type V Vaportight Heavy Duty Lighting Condulet with Shatterproof glass for use in the food industry

Type GS Vaportight Lighting Fixture for GS Series Condulets

Type VDA Vaportight Tank or Vat Light

Type VG Vaportight Lighting Condulet

Type ARC Vaportight Lighting Fixture for Obround Condulets

Type GS Vaportight Lighting Fixture for GS Series Condulets

Type VC Vaportight Lighting Condulet

Type VXHA Vaportight Lighting Condulet with flush hubs

Type VR Vaportight Lighting Condulet for mounting on a hand rail

Type VXJ Vaportight Lighting Condulet for making extensions from concealed conduit wiring

Type VS Vaportight Hand Lamp with Rubber Handle

Type V Vaportight Lighting Condulet with Dome Reflector

Type VDA Vaportight Lighting Condulet with Dome Reflector

Type VDA Vaportight Lighting Condulet with Angle Reflector

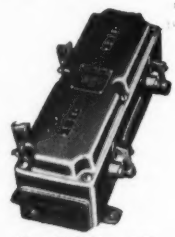
Type RCD-8 Vaportight Lighting Fixture for wall mounting

Type VFC Vaportight Gauge Lighting Condulet

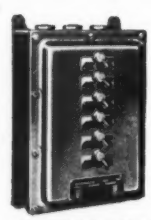
Type WV Vaportight Lighting Condulet with Fresnel Lens

Type VJ Vaportight Lighting Condulet

Type VLG Vaportight Gauge Lighting Condulet Fluorescent


Type YSW Vaportight Circuit Breaker Condulet

Type DVS Dust-Tight and Vaportight Circuit Breaker Condulet


Type DVS Dust-Tight and Vaportight Circuit Breaker Condulet

Type DVP Dust-Tight and Vaportight Panelboard

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Engineering Fundamentals

No. 243

A FEATURE OF THE OIL AND GAS JOURNAL

Principles of the Stadia and Stadia Surveying (continued)

AS stated in the previous article, horizontal sights are the exception rather than the rule in stadia surveying. Hence the next step is to derive the general reduction equations for inclined sights. Such a case is pictured in Fig. 1. The problem is now two-fold, since it is necessary to find (1) the horizontal distance from X to Y and, (2) to determine the difference in elevation between the two points. With the transit set up over point X, the vertical distance from the top of the stake X to the horizontal axis of the instrument is measured. This is known as the H.I. If the middle crosshair is set at this value on the rod, the line of sight will be parallel to the imaginary line joining the top of the stakes X and Y. If the vertical angle of inclination of the line of sight is read from the transit (α in Fig. 1), the angle of inclination between points X and Y will be known. Rod readings A and B are taken on the rod held vertically (shown in Fig. 2 of the previous installment), and their difference gives the stadia intercept, s.

First step in the development of the equations is to imagine the stadia rod or "board" rotated from AB to A′B′, i.e., until it is perpendicular to the line of sight, then $A'B' = AB \times \cos \alpha$ (approx.) or $A'B' = s \times \cos \alpha$. Since A′B′ is the stadia intercept on a stadia rod held perpendicularly to the line of sight, it is equivalent to the intercept on a board held vertically for a horizontal sight. (Refer to Fig. 2 of previous installment.)

Hence, in Fig. 1,

$$d_1 = K \times s \times \cos \alpha \quad (5)$$

and

$$D_1 = K \times s \times \cos \alpha + (f + c) \quad (6)$$

Let H = the horizontal distance from X to Y.

Let V = the difference in elevation between X and Y.

Then $H = D_1 \times \cos \alpha \quad (7)$

Combining Equations 6 and 7:

$$H = [Ks \times \cos \alpha + (f + c)] \cos \alpha \quad (8)$$

$$H = K \times s \times \cos^2 \alpha + (f + c) \cos \alpha \quad (9)$$

and

$$V = D_1 \times \sin \alpha \quad (10)$$

Combining Equations 6 and 10:

$$V = [Ks \times \cos \alpha + (f + c)] \sin \alpha \quad (11)$$

$$V = K \times s \times \cos \alpha \sin \alpha + (f + c) \sin \alpha \quad (12)$$

but $\frac{1}{2} \sin 2\alpha = \cos \alpha \times \sin \alpha$.

Therefore:

$$V = \frac{1}{2} K \times s \times \sin 2\alpha + (f + c) \sin \alpha \quad (13)$$

Equations 9 and 13 are the standard equations used to reduce stadia measurements to distance and difference in elevation.

For internal focusing instruments, where (f + c) may be taken as zero, the equations become:

$$H = K \times s \times \cos^2 \alpha \quad (14)$$

and

$$V = \frac{1}{2} K \times s \times \sin 2\alpha \quad (15)$$

For each 1 ft. of intercept they become:

$$H = K \times \cos^2 \alpha \quad (16)$$

and

$$V = \frac{1}{2} K \times \sin 2\alpha \quad (17)$$

Since K is usually taken as 100 they can be reduced further to:

$$H = 100 \times \cos^2 \alpha \quad (18)$$

and

$$V = 100 \times \frac{1}{2} \sin 2\alpha \quad (19)$$

These last two equations, (18) and (19), are the ones used to develop stadia reduction tables. The tabulated values for any vertical angle are multiplied by the stadia intercept and the results are the horizontal distance and difference in elevation both expressed in feet.

Table 1 is a brief stadia reduction table for vertical angles from 0° to 10°, in steps of 10′. Straight-line interpolation will produce reasonably accurate results.

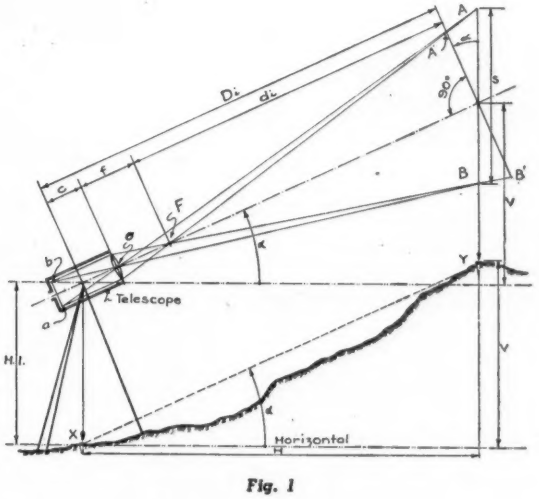

Fig. 1

TABLE 1—STADIA REDUCTION TABLE

Minutes	0° H	0° V	1° H	1° V	2° H	2° V	3° H	3° V	4° H	4° V	5° H	5° V	6° H	6° V	7° H	7° V	8° H	8° V	9° H	9° V	10° H	10° V
0	100.00	0.00	99.97	1.74	99.88	3.49	99.73	5.23	99.51	6.96	99.24	8.68	98.91	10.40	98.51	12.10	98.06	13.78	97.55	15.45	96.98	17.10
10	100.00	0.29	99.96	2.04	99.86	3.78	99.69	5.52	99.47	7.25	99.19	8.97	98.85	10.68	98.44	12.38	97.98	14.06	97.46	15.73	96.88	17.37
20	100.00	0.58	99.95	2.33	99.83	4.07	99.66	5.80	99.43	7.53	99.14	9.25	98.78	10.96	98.37	12.66	97.90	14.34	97.37	16.00	96.78	17.65
30	99.99	0.87	99.93	2.62	99.81	4.36	99.63	6.09	99.38	7.82	99.08	9.54	98.72	11.25	98.29	12.94	97.82	14.62	97.28	16.28	96.68	17.92
40	99.99	1.16	99.92	2.91	99.78	4.65	99.59	6.38	99.34	8.11	99.03	9.83	98.65	11.53	98.22	13.22	97.73	14.90	97.18	16.55	96.57	18.19
50	99.98	1.45	99.90	3.20	99.76	4.94	99.56	6.67	99.29	8.40	98.97	10.11	98.58	11.81	98.14	13.50	97.64	15.17	97.08	16.83	96.47	18.46

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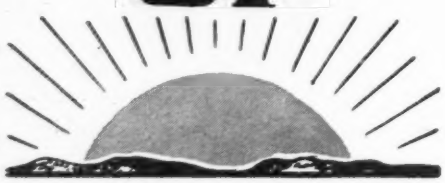

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Open-Type Coolers and Boxes

ALTHOUGH coil-in-box equipment or banks of tubes connected to headers do not give as high transfer rates as tubular-type coolers, they are widely used and have certain advantages. The large volume of water surrounding submerged coils or banks of tube is good insurance against fire in case the water supply fails. Banks of tubes, whether submerged or sprayed, can be moved as a unit and can be readily accessible for cleaning or the replacement of tubes.

The over-all transfer rates shown in Tables 1, 2, 3, and 4 were computed from data given in Notebooks Nos. 91, 92, 93, 94, and 95 which were published in May and June 1946. The factors that mainly govern the transfer rate are:

1. **Fouling factor** of water. Values ranging from 3 for the best river water to 35 for the dirtiest canal or spray pond water. Products that are at a high temperature require the highest water-side fouling factors.

2. **Velocity.** In many equipments a fluid velocity of only 0.5 ft. per second is attained, whereas occasionally a velocity of 1.5 ft. per second is encountered.

3. **Viscosity.** The low-viscosity fuel of Table 3 is A.S.T.M. Fuel 5 (40 sec. Furol minimum) and the high-viscosity oil is Bunker C or A.S.T.M. Fuel 6. In Table 4 the extremes in viscosity are S.A.E. 30 (60 sec. Univ. at 210° F.) and S.A.E. 70 (150 sec. at 210° F.).

These factors should be considered in using the tables and even after careful consideration the transfer rates so obtained are only approximations.

Submerged coils may exhibit somewhat lower rates than those shown in the tables because they are not or cannot be easily cleaned. Tube-bank sections (submerged or sprayed) that are cleaned regularly may give rates somewhat greater than those shown.

TABLE 1—CONDENSERS—OVER-ALL TRANSFER RATES (NO AFTER-COOLING)

		B.t.u. per sq. ft.-hr., °F.						
		Submerged				Sprayed		
Material—	Temp. avg. (°F.)	Low vel. bad water	Spray pond	River water	High vel. best water	Low vel. bad water	River water	High vel. best water
Gasoline	150	26	38	50	62	40	59	75
	200	24	37	49	59	37	56	71
	250	22	35	47	57	34	53	67
Kerosene	300	20	34	45	55	32	50	63
	350	18	32	43	53	29	48	60
Distillate	400	15	29	41	50	26	44	56
Gas oil	450	12	27	38	48	22	41	53
	500	9	24	35	44	18	37	48

TABLE 2—DISTILLATE COOLERS AND AFTER COOLERS

		B.t.u. per sq. ft.-hr., °F.						
		Submerged				Sprayed		
Material—	Temp. avg. (°F.)	Low vel. bad water	Spray pond	River water	High vel. best water	Low vel. bad water	River water	High vel. best water
Naphtha	100	12	25	38	45	13	38	46
	150	13	26	39	46	15	41	49
	200	14	27	40	48	17	43	53
Kerosene	250	15	28	41	50	20	46	57
Distillate ...	300	16	29	42	52	22	49	61
Gas oil	350	17	30	44	55	25	52	66
	400	20	32	46	58	28	56	72

TABLE 3—COOLING FUEL OILS

	B.t.u. per sq. ft.-hr., °F.						
	Submerged				Sprayed		
Temp. avg. (°F.)	High visc. bad water	Spray pond	River water	Low visc. best water	High visc. bad water	River water	Low visc. best water
150	5	8	11	12	5	12	13
200	5	10	14	15	6	15	16
250	6	12	17	18	6	18	20
300	6	14	20	22	7	22	24
350	7	16	23	26	7	25	28
400	7	18	26	30	8	29	33
450	8	21	30	35	8	33	39

TABLE 4—COOLING LUBRICATING OILS

	B.t.u. per sq. ft.-hr., °F.						
	Submerged				Sprayed		
Temp. avg. (°F.)	High visc. bad water	Spray pond	River water	Low visc. best water	High visc. bad water	River water	Low visc. best water
150	8	10	11	12	8	9	10
200	8	11	14	15	9	13	14
250	8	13	17	19	10	18	20
300	9	15	22	24	11	24	27
350	9	18	29	33	12	32	36
400	10	22	37	45	14	42	51

No. 101 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

TO THE USER OF FABRICATED PIPING

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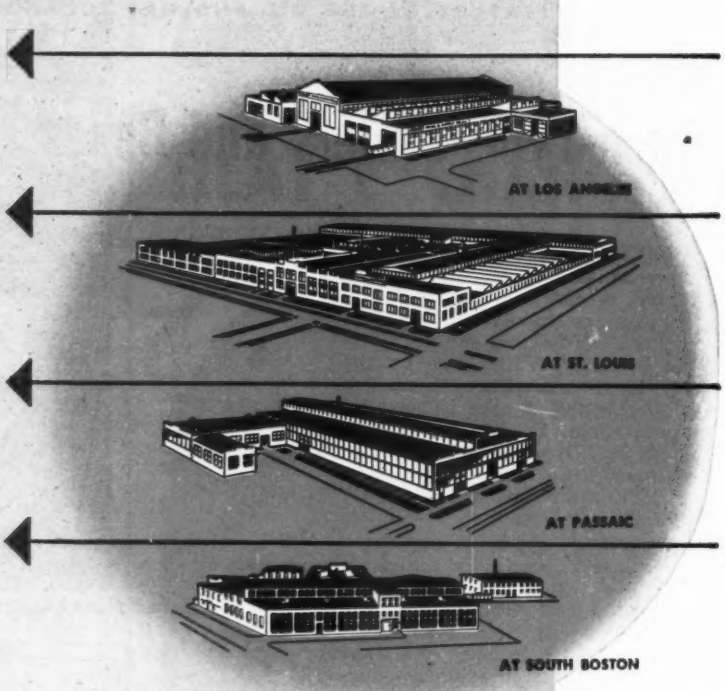

There are four Midwest pipe fabricating plants located in different parts of the country, because Midwest has found that "four plants are better than one" for the user of piping.

In addition to shortening shipping distances and making for a better understanding of the customers' individual problems, four plants provide other important benefits in which all Midwest Piping users participate.

Extra reserve capacity is provided for the emergency job. If extreme speed is sufficiently important, a job can be divided among two or more plants. An overload in one plant often can be handled by temporarily transferring skilled workers from other plants.

One of the greatest advantages is the continuous exchange of information and experience between staff members of the four plants. New techniques developed in one plant are made known to all. Piping problems which may be new to one plant probably are very familiar to another where the "know how" information is available at once. Friendly rivalry—constant study of piping problems by four organizations—tends to advance the art of piping fabrication much more rapidly than would otherwise occur.

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PIPING FABRICATORS AND CONTRACTORS

REFINING

Standard of California To Build New Unit

SAN FRANCISCO.—Plans for construction of a $2,250,000 crude-distillation unit at its El Segundo, Calif., refinery were announced last week by Standard of California following federal approval of the project.

The unit will have a capacity of approximately 30,000 bbl. daily. It will handle the first step in distillation and its modern processes will increase utilization of the crude. Construction is scheduled to begin in September with completion set for early 1947.

German Jet Engines Now Available for Research

DAYTON.—Interested oil companies may obtain German Jumo 004 jet engines on loan from the U. S. Army Air Corps for research and experimentation, according to an announcement by Lt. Col. William R. Boutz, deputy chief of Air Corps collection division's intelligence.

These engines will be shipped to destination designated by the oil company on a government bill of lading without cost to the company. About 160 engines are available, of which at least 100 should be in operating condition. Communications regarding the engines should be addressed to the commanding general, AMC, Wright Field, Ohio, attention: TSILI-4.

These engines are axial flow turbo jet, with an eight-stage compressor, weigh 1,775 lb. They exert a maximum thrust of 1,980 lb., attain a 8,700 maximum r.p.m. and burn 1.38 to 1.40 lb. of fuel per pound of thrust per hour.

New Synthetic Grease Developed by Texaco

NEW YORK. — Development of a new synthetic, low-temperature grease which demonstrates a wider range of operating temperatures was announced last week by The Texas Co.

The lubricant is designed for use in all types of control bearings, actuators, the new-style aircraft propeller governors, aircraft instruments, aerial cameras, and the fly-power motors in radar equipment.

Approved under the rigid requirements of the recently released AN-G-25 Specification, the product matches the performance of the four aircraft greases previously required in the application temperature range of —100° F. to +300° F. The grease does not lose its fundamental lubricating characteristics at any temperatures likely to be found on the ground or at any altitude in aircraft, The Texas Co. said.

It is a lithium base grease in which a synthetic compound is employed as the oily constituent. It is light tan in color and has a buttery texture. It is also put out in a form containing rust inhibitors.

In high-temperature performances, the product passes tests requiring it to lubricate satisfactorily for 1,000 hours at 250° F. and 10,000 r.p.m. and for over 300 hours at 300° F. and 10,000 r.p.m. In the worker test, the grease showed no change in penetration even after 100,000 strokes in the ASTM worker, the announcement added.

Operations Resumed at Monsanto Chemical Plant

HOUSTON. — Monsanto Chemical Co.'s alkylation plant in Texas City is now back in full operation here after repairs of damage sustained in a destructive fire December 3.

The plant was closed after the fire swept through the property. Replacements sufficient to place the first half of the plant in operation were se-

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cured April 1, and the other part of the plant resumed operation last week, according to H. K. Eckert, general manager.

Leadership Course Held For Jersey Standard Group

Standard Oil Co. (N. J.) recently held "leadership" classes at Bayway, N. J., for representatives from Colonial Beacon Oil Co., Standard Oil Development Co., and Imperial Oil, Ltd., in addition to men from its own manufacturing and sales departments. The classes were designed to teach the men how to arrange and conduct foreman conferences.

The courses, arranged by the employe-relations department of New Jersey Standard, presented methods of organizing a series of foreman conferences, selection and use of conference devices, and preparing auxiliary conference material.

Overton Moves Offices

DALLAS.—Overton Refining Co., Inc., has announced the removal of the company's general offices from Tyler, Tex., to the Mercantile National Bank Building in Dallas. A. A. Garrett, executive and general counsel for the company, also has moved his offices to the same address.

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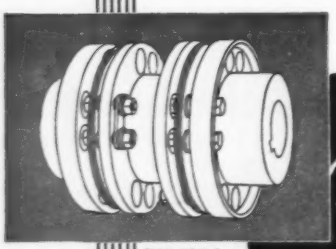

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Mid-Continent Lube Oil Inventories Down in May

A 23-day supply of bright stock and a 20-day supply of viscous neutrals were on hand at the end of May by 13 companies in the Mid-Continent area manufacturing lubricating oils. This compares with a 33-day supply of bright stock last month. The supply of viscous neutrals was unchanged.

A summary of May operations by Western Petroleum Refiners Association shows production of 223,319 bbl. of bright stock during the month, declining 4.4 per cent under April. Production of viscous neutrals was 340,867 bbl., a decline of 3.8 per cent under April. Production of paraffin oils, steam refined stock and blended oils were 71,451 bbl., 32,019 bbl. and 352,469 bbl. in May.

Stocks on hand May 31 were: Bright stock, 178,484 bbl., 28.1 per cent under the previous month; and viscous neutrals, 208,010 bbl., which declined slightly under April stocks.

Toluene, Xylene Uses Shown in U. S. Report

WASHINGTON. — Allocations of toluene and xylene in the war program, disclosed by the Civilian Production Administration and the Department of Commerce, show the greater share of the products went into aviation gasoline manufacture and other military use.

Total allocations of toluene, for the period from January 1, 1943, through June 30, 1945, were 521,274,000 gal., of which manufacturers of aviation gasoline received 90,425,000 gal. A total of 399,980,000 gal. was allocated to other military uses. Miscellaneous uses, including medicinal, chemical research, and small lot sales accounted for 9,516,000 gal.

Total xylene allocations, for the 12-month period ending June 30, 1945, were 95,770,000 gal., of which 70,270,000 gal., or 73.4 per cent, was used in aviation gasoline blends. Direct military use accounted for 916,000 gal. Data on xylene produced in government plants under the ordnance program are not available.

U. S. Furfural Plant Offered

WASHINGTON. — A Memphis Tenn., plant formerly operated by Q. O. Chemical Co. has been declared surplus and is being offered for sale or lease by War Assets Administration. The plant was designed to produce furfural in connection with the wartime synthetic rubber program and has a rated capacity of 24,000,000 lb. per year.

PIPE LINES

Construction Moves Ahead On New Humble Pipe Line

HOUSTON. — Humble's new 276-mile products pipe line which will link the Houston refinery area with North Texas is reported well over half completed.

The 8-in. line extending from Baytown to Dallas is being built in two sections, one from Hearne to Dallas and the other from Baytown to Hearne. In late June, 91.7 miles of the Hearne-Dallas section was reported completed, and 63.8 miles on the Baytown-Hearne section.

Built of new steel pipe, the line's estimated cost is $4,000,000. Expected delivery rate will be about 15,000 bbl. daily of gasoline and other products. The route follows Humble Pipe Line Co.'s butane-propane line from Baytown to Satsuma station northwest of Houston and from there straight to Navasota and Hearne. From Hearne, it follows a new right-of-way to a terminal north of Waco, and then northward to Dallas.

Humble's sales department will operate terminals and storage facilities near Houston, Hearne, Waco, and Dallas. Three weeks ago, Texas Pipe Line Co. and Magnolia Pipe Line Co. disclosed plans to build a new products line from near Beaumont to the Dallas-Fort Worth area and to San Antonio. The proposed route of this line northward from a point near Houston to the Dallas - Fort Worth area will parallel Humble's line within a distance of 1 to 2 miles.

The coating and wrapping machine in use on construction of the Hearne-Dallas section of Humble's line provides a double wrap instead of the usual single wrap. Its automatic operations lay a coat of molten enamel, a spiral wrap of Fiberglas, another coat of enamel, and then a spiral wrap of asbestos felt. Pipe for the Baytown-Hearne section is being coated and wrapped by stationary machines before it is sent into the field.

Higher Production Due With New Hamilton Dome Line

With completion of Hamilton Pipeline Co.'s new 24-mile 8-in. crude line, most of the producers in Wyoming's Hamilton Dome field are considering drilling new wells and deepening many older wells to the Tensleep sand. As a result, it is expected that production in the near future will be brought to the estimated 10,000-12,000-bbl. capacity of the pipe line.

Hamilton Pipeline Co.'s line extends from the field to Thermopolis in Hot Springs County. The company is controlled by Stanley G. Gray and D. R. Bumford who also hold controlling interests in Comet Refining Co., Minneapolis, Minn. Surveys made for the field's production before the line was contracted for show an estimated production of about 6,000 bbl. daily.

Under the first test, the line operated on less than 50 lb. pressure, due to the consistent and gradual fall of the terrain where the line was installed. Recently, Argo Oil Co. contracted its production to Standard Oil Co. of Indiana, and Standard contracted with Comet Refining for this

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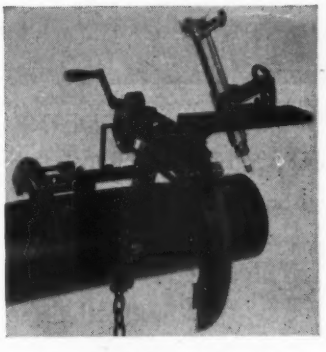

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PIPE LINE SPECIALISTS

production. One of the large operators in the field, Empire State Oil Co., also operates a refinery at Thermopolis, more generally known as the Curtis interests. A loading rack capable of handling 22 tank cars at a time has been completed adjacent to the terminal in Thermopolis making a very complete and efficient operation.

New Crude Line Completed By Panhandle Refining

WICHITA FALLS, Tex.—Panhandle Refining Co. has completed a 4-in. crude line to give Tharp pool in Throckmorton County its first pipeline outlet.

The line extends 20 miles from the pool eastward to Swastika field in Archer County where it connects with Continental Oil Co.'s line. Producers in Tharp pool have used trucks to move their oil to Graham since discovery of the pool about a year ago.

Humble Planning Loops On West Texas System

MIDLAND, Tex. — Humble Pipe Line Co. is planning to lay 70 miles of 12-in. and 14 miles of 10-in. loop line to increase the capacity of its system in West Texas.

The loops will be laid between the McCamey and Kemper terminals. They will increase capacity of the line to Ingleside from 61,000 to 75,000 bbl. daily. Pipe will not be available until next year.

Six Killed in Pipe-Line Accident in Illinois

A blast which occurred when a pipe-end attachment was blown off a 24-in. high-pressure natural-gas line near La Salle, Ill., killed six workmen and injured 10 others last week.

Workmen said they had been removing a 30-ft. section of the line prepartory to installing connections for an expansion. The pressure on one end of the severed line had been shut off at a nearby station, and a temporary gate or pipe-end had been installed on the other section.

The blast blowing off the pipe-end lifted some of the workmen 30 ft. into the air from a 15-ft. ditch and hurled them 325 ft., it was reported. Among the injured was M. M. Whitson, Geneseo, Ill., superintendent of the line in the Ottawa district.

The line, owned by Natural Gas Pipe Line Co. of America, Chicago, extends from Texas to Chicago and other eastern points. Company officials said reservoirs along the route prevented any interruption of service as a result of the accident.

The dead, all welders or helpers, were James Paetzold, 54, Beatrice, Neb.; Alvin E. Cleary, 40, and Frank Ingram, 28, both of Geneseo; Ben A. Marsh, 35, and Robert Walstrom, 26, Belvidere, Ill.; and Lenn D. Swan, 39, Truro, Iowa.

$19,000,000 in Pipe Ordered For Texas-Michigan Line

MILWAUKEE.—A $19,000,000 order was placed here last week for pipe to be used in Michigan - Wisconsin Pipe Line Co.'s proposed 26-in. line from Texas to Michigan.

The order was placed with A. O. Smith Corp by United Light & Railway Service Co. of Davenport, Iowa, which is affiliated with Michigan-Wisconsin Pipe Line. It was subject to approval of the $71,000,000 project by the Federal Power Commission in Washington.

The 1,285-mile line will extend from Hugoton field to Austin storage field in Michigan. Michigan-Wisconsin Pipe Line is a subsidiary of Michigan-Consolidated Gas Co. which is a part of the United Light & Railways Co. system. Headquarters for Michigan Consolidated is in Detroit.

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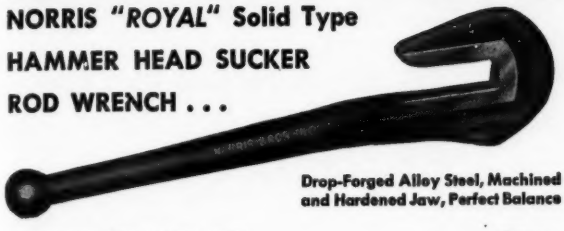
NORRIS "ROYAL" Solid Type HAMMER HEAD SUCKER ROD WRENCH . . .



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NORRIS "BUMP-UP" Hinged Type SUCKER ROD WRENCH . . .

Drop-Forged, Heat-Treated Alloy Steel Jaw; Perfect Balance; Opening Machined to Exact Dimensions

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This ultra-violet lamp can help solve your oil testing problems . . . in the field and in the laboratory. Write today for the authoritative bulletin, *Fluorochemistry in Petroleum Science*. Learn how MINERALIGHT can be used for quick, easy petroleum identification in field and laboratory testing, prospecting and analysis of cores, sands and muds.

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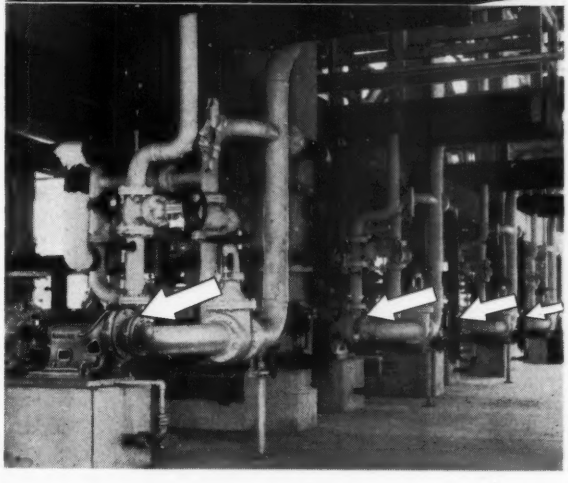


THAT Goulds Pumps can take it, is exemplified by many tough services they are handling in some of the nation's largest synthetic rubber plants: hydrocarbons up to 410°F, hot water, alcohol, mash containing up to 6% solids, brines, sludges, caustics, styrene and butadiene.

Besides these, Goulds supplied many pumps for such services as boiler feeding, fire protection, general water supply, sump, drainage service, etc.

For the most part, *standard* Goulds pumps met these requirements. In some cases, hot, volatile liquids called for water-cooled stuffing boxes or other special constructions. But Goulds wide line of pumps was readily adapted to meet a variety of conditions quickly and economically. It still is!

Whether your job requires single or multi-stage, single or double-suction centrifugals, Goulds has the right pump for the job.

Goulds PUMPS, INC.
the PUMP FOR the JOB SENECA FALLS, N. Y.

Natural Gas

FPC Approves $31,000,000 Expansion Plan of T. G. & T.

HOUSTON.—Tennessee Gas & Transmission Co. last week reported the Federal Power Commission has approved an estimated $31,000,000 worth of additions to its natural-gas pipe-line system which will allow the company to purchase in excess of 100,000,000 cu. ft. of waste gas now being flared in South Texas oil fields.

The projects include construction of a 95-mile extension of its line to the San Salvador field in the Rio Grande Valley, an area which previously has had little market for its gas reserves; and increasing the capacity of its main line by approximately 40 per cent, of which three-fourths will be supplied by gas formerly wasted.

The company has negotiated for the purchase of 87,000,000 cu. ft. daily of gas now being wasted in the Selligson, Tom O'Connor, Heyser, and Katy fields.

To handle the increased load Tennessee Gas & Transmission Co. has been given permission to build three new compressor stations, add 20,000 hp. to existing compressor stations, and lay 400 miles of 26-in. loops and 10 miles of 24-in. loops on its main line. The new stations will be near Victoria and Cleveland, Tex., and at Natchitoches, La.

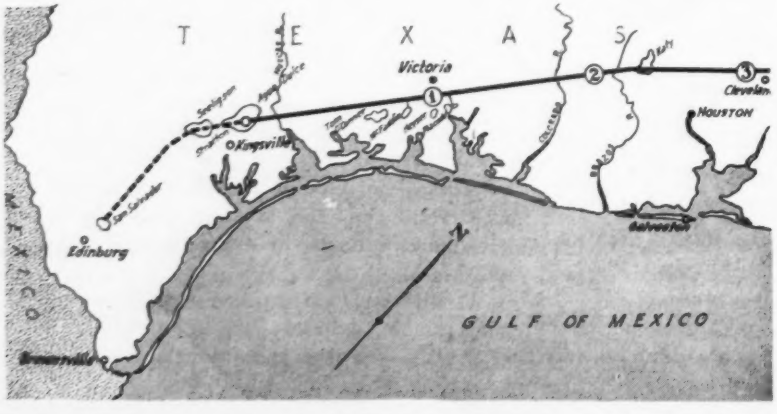
The 16-in. extension to the Rio Grande Valley will have a capacity of 96,000,000 cu. ft. daily. FPC also granted the company permission to purchase four existing compressor stations from Reconstruction Finance Corp. which were completed early this year.

California Gas Association Attacks FPC Inquiry

LOS ANGELES.—In an attack on the Federal Power Commission and its current investigation of the natural-gas industry, the Independent Natural Gas Association of California last week asserted that the assumption of "new or unlawful powers by a bureau" can only be stopped by Congress or the courts.

Rush M. Blodget, secretary, told members in an association bulletin that the organization has made no appearance at the hearing, taking the position that the powers of FPC should be limited to powers granted it by Congress. "It (the association) believes that it avails nothing to ask a federal bureau not to seek to grasp new powers; and it believes that going to Washington to lay all our chips and whetstones on the table for inspection by FPC is a futile concession to the inquisitors," he said.

On another subject, Blodget in the bulletin declared the price of domestic California gas "most certainly should come in for adjustment" with the construction of the new Texas-California gas pipe line. The price of California gas, he said, has remained firm pending actual construction of the line. "When the line is completed, and the price of outside gas delivered at Santa Fe Springs is settled at from 17 to 19 cents per 1,000 cu. ft. (with the price in the Hugoton field stiffening) the matter of the price of domestic California gas marketed alongside the 17-cent gas most certainly should come in for adjustment," he said.



Illustrated here is the $31,000,000 expansion program of Tennessee Gas & Transmission Co. The additions have been approved by the Federal Power Commission. The dotted line traces the 95-mile extension to the Rio Grande Valley. Marked 1 and 3 are proposed new compressor stations at Victoria and Cleveland, Tex., respectively. A third station will be built at Natchitoches, La. No. 2 is the existing station at East Bernard, Tex.

FPC Holds East Ohio Gas Subject to Jurisdiction

WASHINGTON.—In a Federal Power Commission order last week East Ohio Gas Co., Cleveland, Ohio, was found to be a natural-gas company within the meaning of the natural gas act and directed to comply with outstanding FPC orders requiring the filing of a statement of the original cost of its properties, the reclassification of its accounts in accordance with the uniform system of accounts for natural gas companies, and the filing of annual financial and statistical reports.

The commission's action was based upon evidence submitted by East Ohio at a hearing held March 19. The company was directed to show cause why it has failed and refused to comply with the act and with orders of the commission.

Gas Course Planned

DALLAS.—Gas technology will be the subject of a short course planned for August 27-29 by the Texas College of Arts and Industries, Kingsville, Tex. Robert Suttle, managing director of the Southern Gas Association, Dallas, was recently in Kingsville conferring with Dr. Frank H. Dotterweich, head of the engineering department, on the outline of the course.

Natural Gasoline

Operations Started at Midland Gasoline Plant

MIDLAND, Tex.—Test runs have been completed at C. V. Lyman's new 15,000,000-cu. ft. natural gasoline plant in the Emperor field of Winkler County, West Texas. According to reports here, the plant was placed in operation last week.

A portion of the residue gas will be used for repressuring adjacent leases in the field, and the remainder will go into the new line from El Paso Natural Gas Co.'s Jal-Keystone system to the plant. Natural gasoline and other products will be sold to the El Paso refinery of Standard Oil Co. of Texas.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	July 6 crude oil	B. of M. July demand	June 29 crude oil
Alabama	1,200	950	1,100
Arkansas	78,800	78,000	77,900
California	878,250	844,000	886,750
Colorado	29,960	28,000	29,960
Eastern	67,500	64,000	67,000
Florida	350	250	200
Illinois	211,350	210,000	206,350
Indiana	19,800	19,000	19,700
Kansas	254,750	260,000	260,300
Kentucky	31,350	31,000	30,700
Louisiana	389,800	380,000	384,200
North Louisiana	89,150	.....	88,100
South Louisiana	300,650	.....	296,100
Michigan	47,750	47,000	48,150
Mississippi	63,300	60,000	63,500
Montana	25,680	22,000	25,690
Nebraska	800	800	750
New Mexico	98,150	97,000	97,600
Oklahoma	383,350	384,000	387,100
Texas	2,227,550	2,110,000	2,243,750
Dist. 1 (Southwest)	19,500	.....	19,650
Dist. 2 (Southwest)	158,100	.....	155,650
Dist. 4 (Southwest)	228,000	.....	229,600
Dist. 3 (Gulf Coast)	511,350	.....	515,400
Dist. 5 (Eastern)	44,150	.....	43,950
Dist. 6 (Eastern)	107,800	.....	107,350
East Texas Field	315,000	.....	326,000
Dist. 7C (West)	28,000	.....	28,450
Dist. 8 (West)	569,150	.....	566,450
Dist. 7B (W. Central)	32,000	.....	32,400
Dist. 9 (N. Central)	129,300	.....	132,400
Dist. 10 (Panhandle)	85,200	.....	86,450
Wyoming	109,430	112,000	110,090
Total United States	*4,919,120	4,748,000	4,940,790
Change from prev. wk., down	21,670		

Total production January 1-July 6 ..... †876,150,559 bbl
Same period last year (crude, plus condensate).. 897,506,850 bbl
*Not incl. 21,500 bbl. condensate. †Incl. 4,758,900 bbl. condensate

CRUDE-OIL STOCKS 222,193,000 bbl. as of June 22—up 2,078,000 bbl. One year ago 220,974,000 bbl.

GASOLINE STOCKS 92,333,000 bbl. as of June 29—down 561,000 bbl. One year ago 86,145,000 bbl.

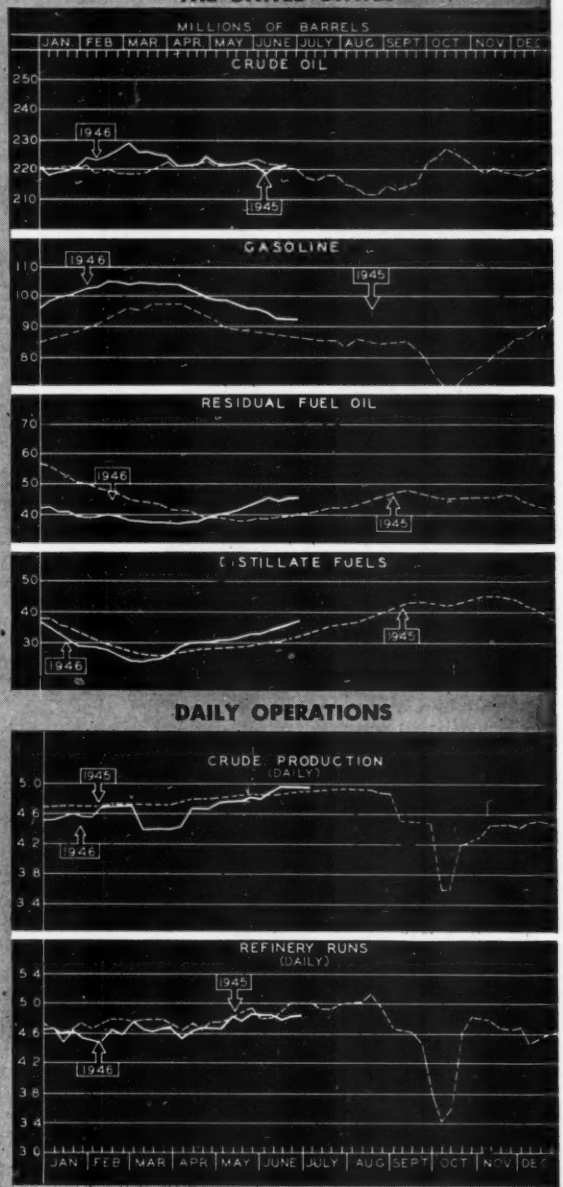
RESIDUAL FUEL-OIL STOCKS 46,447,000 bbl. as of June 29—down 79,000 bbl. One year ago 40,631,000 bbl.

GAS OIL AND DISTILLATE STOCKS 37,762,000 bbl. as of June 29—up 1,421,000 bbl. One year ago 32,214,000 bbl.

CRUDE-OIL PRODUCTION 4,919,120 bbl. as of July 6—up 21,670 bbl. One year ago 4,890,500 bbl.

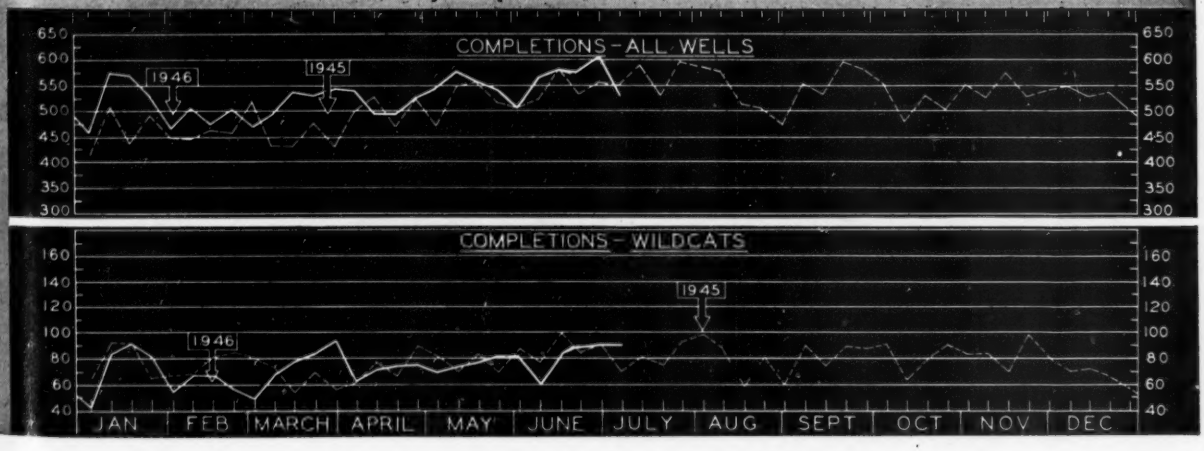
REFINERY RUNS 4,854,000 bbl. daily week ended June 29—up 18,000 bbl. One year ago 5,049,000 bbl.

OIL STOCKS IN THE UNITED STATES



DAILY OPERATIONS

Solid line charts weekly completions, service wells in Eastern area included



Reduced Reproduction of recent advertisement of The Happy Company.

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Reasons Why HAPPY PUMPERS Chain Driven Units . . .
1. CHAIN IS FLEXIBLE . . . Unlike the rack and pinion, a chain fits perfectly around and on many sprocket bearings simultaneously. Thus all stresses, shears and strains are divided over many bearing points and areas. Division of pull means less strain on all equipment.
2. RESERVE POWER IS PLENTIFUL . . . Performance has proved the extremely high reserve capacity of a chain drive before distortion or breakage. Roller chain tension members and wear members are separate and distinct. Wear on sprocket teeth is very slight—due to rolling action.
3. LUBRICATION IS POSITIVE . . . Chain has many oil films because of the many contacts between rollers and sprocket teeth. In addition there are numerous oil films between rollers, bushings and pins of the chain links.
All these features contribute to the superior efficiency, economy and endurance of chain-driven HAPPY PUMPERS.
Engineers and builders of oil field equipment expend great effort to assure maximum operating results—efficiency and long-life dependability.
Leaders in the field have for many years selected DIAMOND Roller Chains for many reasons, three of which are cited in the reduced reproduction of the advertisement above.
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TULSA, OKLAHOMA
BRANCH OFFICES:
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Smackover Arkansas
Odessa Texas
Kilgore Texas
Pampa Texas
Salem Texas
Wichita Illinois
Ellinwood
DIAMOND ROLLER CHAINS
HAPPY PUMPER

Exploration and Drilling

New Pay in Rangely Field

A 23-HOUR gage of 1,175 bbl. of 36.2° oil by Continental Oil Co. 2 Rooth, SW SW 15-2n-102w, a west outpost test in the Rangely field, Colorado, establishes a new pay zone some 700 ft. shallower than the main Weber sand. The discovery well, elevation 5,765 ft., unexpectedly ran into a blowout of oil and gas at 6,109-21 ft., and has been undergoing work for a test, and if necessary, a shutoff, before going on down to the Weber.

After conditioning the hole for a test, the first gage showed 133 bbl. in the first hour and only 73 bbl. total in the next 6 hours. The well seemed to be sanding up, so was cleaned, and after necessary preparations, further tests were made. The sanding trouble appears to have cleared up, for the time being at least, and the well settled down to a fairly steady flow of 50 bbl. per hour.

The pay is definitely in the Chugwater red bed series of Triassic age, and is tentatively being called the Shinarump conglomerate. It might be called the equivalent of the Nugget or the Sundance sand. In this region the Triassic red beds become progressively more sandy from east to west. Datum on the Chinlee in this test is —175 ft.

As usual in Rangely, the new well starts an argument among the geologists. While no well in the field has previously tested this formation, some geologists claim the pay zone extends uniformly across the structure and can be traced on the electric logs, altough concededly it is not simple to do so. Other geologists claim that it is a new sand zone and cannot be found even in the Continental 1 Rooth, ¼ mile north.

If the sand extends over the whole structure, the question arises as to why none of the previous wells found anything in it. Of course they weren't looking for anything, and may have mudded it off. On the other, perhaps even if present, it was too tightly cemented to have any oil or gas present. Thus, even granting the sand extends over the whole field, the question remains, does it have oil everywhere, or is it a porosity trap formed on the flank of the structure, resulting from difference in cementation and resultant porosity?

If the sand does not extend over the whole field, and is fingering in, to be found for the first time in 2 Rooth, how extensive it is going to be? On a structure the size of Rangely (100 sq. mi. within the lowest closing surface contour) a stratigraph trap, resulting from the pinching out of a fingering sand, could still result in a sizable oil field. Moreover, in that case, it might easily produce farther down dip than the deeper Weber pay.

SOUTHWEST TEXAS

Atascosa County Test Has Oil in Reklaw Sand

CORPUS CHRISTI.—H. R. Smith and Skinner & Eddy Corp. 1 G. F. Weigang, a wildcat in southeastern Atascosa County, recovered 2,348 ft. of 25° gravity oil at 3,760-70 ft. in 16 minutes from the Reklaw sand, ¼-in. choke on top and bottom, bottom-hole pressure 1,500 psi., shut-in pressure 1,650 psi. The well is about 8 miles southwest of the Hobson field in Karnes County, the nearest production.

United North and South Development Co. 1 J. F. Webb, James Hodges Survey, wildcat discovery 4½ miles southwest of Luling, in Guadalupe County, is reported to have pumped an estimated 3 bbl. per hour after acidizing with 1,500 gal. through perforations at 2,421-53 and 2,485-2,505 ft. The well found saturation in Serpentine and Austin chalk at this level.

At West Magnolia City field in Jim Wells County, Ralph E. Fair, Inc. 1 Wm. F. Filter, W. N. Staples Survey 208, gaged an estimated 6,250,000 cu. ft. of gas per day from the new shallow gas pay at 3,752-53 ft. The shut-in pressure was 1,750 psi. The 5½-in. casing was set to 3,880 ft. for the completion, and total depth is 5,845 ft. The well missed the 5,400-ft. discovery oil pay, and also missed in the deeper Stillwell sand.

There were 28 new locations reported this week, 4 being wildcats, 1 each in Refugio, Starr, Webb, and Williamson counties. Refugio County led with four new locations reported while Brooks, Karnes, and Starr each received three locations. Of the 36 completions only one was a successful exploratory test while 7 were dry wildcats. The new pay opened is in Starr County, and the dry wildcats are two in Duval, and one each in Brooks, Bexar, Karnes, Webb, and Willacy counties. The greatest activity was shown in Refugio County where five field wells were completed, all oil wells.

SOUTHWEST TEXAS SUCCESSFUL WILDCAT

Starr County: New oil pay, Cortez field—W. H. Holland 2 Roos-Bennett, Share 100, Porcion 93, top of pay 2,910 ft., TD 3,006 ft., PT 66 bbl. oil per day through a ¼-in. choke, gas-oil ratio 4,000 cu. ft., TP 550 lb., CP 800 lb., gravity 22°, no water.

SOUTHWEST TEXAS WILDCAT FAILURES

Bexar County: Ernest J. Biskamp 2 State of Texas, Wm. Small Survey 26, 2 mi. SE of San Antonio, dry, TD 1,255 ft.

Brooks County: Grey & Wolfe and La Gloria Corp. 1 Charles S. Lips, El Perdido grant, dry, TD 7,015 ft.

Duval County: Bridwell Oil and American Republics 1 E. & A. Flores, in J. Pointevent Survey 529, dry, TD 4,210 ft.

H. H. Howell 2 Lizzie Singer, G. Cumberland Survey 4, 5 mi. N of Benavides, dry, TD 5,655 ft.

Karnes County: Gulfshore Oil Co. 1 Alvin Wagener, Wm. Hunter Survey, ½ mi. SE of Gillette, dry, TD 6,507 ft.

Webb County: O. W. Killam 1 Servando Benavides, AB&M Survey 685, 5½ mi. NE of Oilton, dry, TD 3,825 ft.

Willacy County: Humble 1 Sauz Ranch-Jardin, in San Juan de Carricitos grant, 10 mi. NE of Raymondville, dry, TD 12,290 ft.

PERMIAN BASIN

Gulf Well Opens New Fullerton Field Pay

MIDLAND.—Gulf Oil Corp. 2-D University "Z," Section 42, Block 13, University Lands, in the South Fullerton field of Andrews County, topped the Pennsylvania lime at 8,285 ft. On a 150-minute drill-stem test from 8,285-8,320 ft. it flowed 25 bbl. of 42°-gravity oil in 30 minutes.

This is a new pay for the Fullerton field. Humble Oil & Refining Co. will drill a 11,000-ft. Ellenburger wildcat in the Dollar Hide (Devonian) area of southwestern Andrews County. The test will be 2 E. P. Cowden, Section 7, Block A-55, Public School Lands, ⅜ mile northwest of Union Oil Co. 2 Cowden, nearest Devonian producer. Humble 1 Cowden, Section 13, Block A-55, Public School Lands, ½ mile south of the discovery well of the Dollar Hide pool, was drilled to 10,620 ft. in lime chert of the Devonian. Operator was preparing to take a drill-stem test.

Humble Oil & Refining Co. 1 Lulu C. Harris et al, Section 114, Block 6, H&TC Survey, wildcat 12 miles southwest of Water Valley, Sterling County, ran a 2-hour drill-stem test from 8,243-8,402 ft. in the Ellenburger. Recovery was 3,208 ft. of mud and 1,516 ft. of sulfur water cut with gas and mud. It is dry at 8,402 ft. Elevation is 2,350 ft. Humble 1 Moore, Section 45, Block 5, H&GN Survey, 1 mile west of the discovery well in the Polar pool of Kent County, was drilling below 7,692 ft. in lime and chert. A drill-stem test was attempted from 7,545-7,660 ft., but the packer failed.

Stanolind Oil & Gas Co. and Westbrook-Thompson 35-A Hendrick, Section 33, Block 26, Public School Lands, Ellenburger test in the Hendrick pool of Winkler County, the deepest drilling well in West Texas, was drilling below 12,787 ft., probably in the Simpson. Hunt Oil Co. 1 E. R. Hill, Section 9, Block B-11, Public School Lands, southeastern Winkler County wildcat 8

miles south and slightly east of Kermit, having drilled to 8,821 ft., reported to be in the Pennsylvanian, will plug back to about 6,250 ft. Operator will run 5½-in. casing, and test promising shows of oil and gas in the Tubb zone from around 6,100-6,250 ft.

Phillips Petroleum Co. 1-G TXL, Section 11, Block 46, T-1-S, T&P Survey, indicated extension of Devonian production in the Wheeler field ½ mile east of the Ector County side when 2,360 ft. of approximately 38°-gravity oil and 100 ft. of oil-cut mud was recovered on a 90-minute drill-stem test. The test was from 8,440-90 ft. It was drilling below 8,576 ft. in lime and chert.

Welch field, Dawson County, had four completions this week: Garza field, Garza County, three; and Fullerton field, Andrews County, Slaughter field, Hockley County, Keystone-Holt field, Winkler County, and Fort Stockton field, Pecos County, each had two. Fullerton field had four locations and Martin field, Andrews County, two. TXL field, Ector County, has 38 drilling wells; Fullerton field, 31; Keystone-Ellenburger field, Winkler County, 26; Welch field, Dawson County, and Block 31 field, Crane County, 11; Martin field, 9 and Keystone-Holt field, Winkler County, 7.

WEST TEXAS SUCCESSFUL WILDCATS

Andrews County: Extension to old oil pool Stanolind 1-A Lotus Oil Co., Sec. 16, Blk. A-48, PSL Sur., ¾ mi. SW Fullerton field, flowed 159 bbl. day through ¼-in. choke on 2-in. tubing, perf. 6,830-7,106 ft. Clear Fork, gravity 41°, gas-oil ratio 764 to 1, TD 8,593 ft.

Ector County: New oil pay—Shell and Arkansas Fuel 1-E Thomas, Sec. 32, Blk. 45, T&P Sur., TXL field, pumped 16 bbl. day, perf. 7,545-7,695 ft. Wolfcamp, gravity 34.5°, TD 8,028 ft.

Schleicher County: New oil pay—Cooper 1-A Koy, Sec. 38, Blk. L, GH&SA Sur., on north flank Page gas field, elev. 2,312 ft., flowed 1,089 bbl. day through 2-in. tubing, perf. 5,520-70 and 5,610-40 ft. Strawn, gravity 40°, gas-oil ratio 850 to 1, and 24,700,000 cu. ft. gas day, perf. 5,350-5,410 ft., regular pay, TD 5,700 ft.

WEST TEXAS WILDCAT FAILURES

Hockley County: Humble 1 Mrs. C. L. Campbell, Sec. 116, Blk. A, R. M. Thompson, 2 mi. E Anton, elev. 3,440 ft., Ellenburger 11,410 ft., dry, TD 11,730 ft.

Pecos County: Ord Gary 3 University, Sec. 15, Blk. 20, Univ. Lands, Elev. 2,535 ft., 3 mi. NW Taylor-Link field, dry, TD 1,508 ft.

SOUTHEASTERN NEW MEXICO

HOBBS. — Amerada Petroleum Corp. 2 Hare, 33-21s-37e, an old shallow producer in the Eunice area of east central Lea County being drilled deeper, took a 194-minute drill-stem test from 6,456-6,535 ft. in the middle Permian section. Gas came to the surface in 4 minutes after the tester was opened, and drilling mud flowed out in 20 minutes.

The well started flowing oil in 26 minutes producing 51 bbl. in 150 minutes, cut 1 per cent basic sediment and drilling water. Gravity of the oil was corrected to 40°. Gas volume was 1,250,000 cu. ft. daily. Operator was preparing to complete. Humble Oil & Refining Co. 1-B Federal-Leonard, 12-26s-37e, Ellenburger test ¼ mile north of the discovery of the Dublin pool of eastern Lea, after recovering 120 ft. of drilling mud and 4,000 ft. of water on a 2-hour drill-stem test from 12,458-12,490 ft. in the Ellenburger ran electrical survey with total depth of 12,535 ft. in the Ellenburger. Operator was preparing to plug back to about 7,000 ft. in the lower Permian where he will start a series of tests up the hole on streaks having shows.

Two shallow wildcats have been staked in north central Eddy County. R. F. Mansen will drill 1 State, 2,310 ft. from the north and east lines of 36-19s-28e, 2 miles north of the Russell field. It will be drilled to around 1,500 ft. Between the Russell and McMillan fields, Willis Lakey will drill 1 Mac T. Henderson, 2,310 ft. from the south line and 3,630 ft. from the east line of 31-19s-29e. This test will be drilled to 1,100 ft., possibly deeper.

West Roberts field, Lea County, had one completion this week. Square Lake and Benson fields, Eddy County, and Cooper-Jal field, Lea County, each had one location. Caprock field, Chaves and Lea counties, has 27 drilling wells; Drinkard field, Lea County, 17; Square Lake field, 14; Grayburg-Jackson, Eddy County, 11, and Paddock field, Lea County, 8.

SOUTHEASTERN NEW MEXICO WILDCAT FAILURES

DeBaca County: Frank Griggs et al 1 State, 11-4n-26e, elev. 4,341 ft., Abo 3,700 ft., Pennsylvanian 4,640 ft., dry, TD 5,570 ft.

Eddy County: Mac T. Anderson 1 Anderson (Federal), 35-19s-28e, 3 mi. N. Russell field, elev. 3,313 ft., Yates 910 ft., dry, TD 1,885 ft.

Lea County: Mary E. Wills et al 2 Flint, 29-20s-34e, 2 mi. W Lynch field, elev. 3,714 ft., dry, TD 3,368 ft.

CALIFORNIA

Good Prospects For New Pool In Orange County

LOS ANGELES.—A. W. Lyddon appears to have an excellent flowing well in the Huntington Beach - Newport district of Orange County and final completion of this wildcat probably will mean the discovery of a new producing area.

The formation is believed to be the equivalent of the C zone found originally in the Newport field a year or so ago and in which a number of good wells have been completed at Newport, principally by Macoil Co. on the Banning property.

On a formation test, after 7-in. casing had been landed at 5,700 ft. and gun perforated at 5,650-90 ft., Lyddon's wildcat for a time flowed around the drill pipe after the tester had been closed. This wildcat is located in the center of Section 7-6s-10w, and the potentially-productive interval is in rocks of Miocene age. Based on the rate at which this well kicked out of the formation tester and the volume of gas present, Lyddon may have found a new area of major importance.

Developments during the past week appear to have changed the outlook of the wildcat in the El Segundo-Playa Del Rey which Shell is drilling for six major companies on fee-owned acreage.

On a formation test with bottom of the hole at 6,939 ft. and the tester open to 6,862-6,939 ft., the well registered a good blow and the recovery consisted of 3,000 ft. of heavy muddy oil and 100 ft. of oily mud on bottom. A string of 7-in. casing was cemented at 6,875 ft. with 600 sacks of cement, and preparations are now under way to drill ahead a little before making a production test. This wildcat has reached the point where a completion can be expected momentarily. The outlook is for at least small production.

The property on which this well is being drilled was purchased in fee back in 1937 by Richfield, Shell, Standard, Texas Co., Associated, and Union for a cash consideration of $900,000 from the Security First National Bank.

Unless an immediate improvement is shown in Ohio's wildcat, the Gardena area may be removed from the list of promising districts. Ohio has been bailing and swabbing its second Gardena wildcat for the past several days without being able to stimulate a flow. So far the recovery has been salt water. Ohio carried this wildcat down to 10,288 ft., plugged back to 10,040 ft. and landed 7-in. casing at 9,100 ft. Because of the adjacent town lot area, it is problematical whether Ohio will undertake any additional drilling at Gardena in the near future.

Wilmington continues to be the hot spot in California at the present time due to exploitation of the 237 zone which is proving to be one of the most prolific zones in the Wilmington field. The 237 zone is producing approximately 25,000 bbl. per day under some restraint but will probably not go much higher unless some additional gas outlets are made available. Because of the inability of natural-gasoline plants to handle much more gas, operators have found it necessary to cut back production to 900 bbl. per day per well. This has had a tendency to stabilize field production although some wells are still flowing in the 1,000-1,500 bbl. day range. It is not likely that operators will be able to maintain the present 900 bbl. per day maximum, because with additional completions it may be necessary to make a cut to 750 bbl. per day maximum soon. New locations and completions were a standoff this week, and this together with the number of drilling rigs remaining unchanged from last month indicates a balance between new jobs and completions. Wilmington has shown a tendency to absorb the decline being shown in drilling at Cymric and Edison and will probably be able to do so for some time to come.

CALIFORNIA WILDCAT FAILURES

Kern County, Jasmine: Rocket Petroleum Co. 1 Abrams, 26-25s-26e, bottomed in gray sand, top Vedder of Miocene age 4,328 ft., all sands barren, TD 4,358 ft.

Solano County, Liberty Farms: Honolulu and Barnsdall 3 Liberty Farms, 17-5n-3e, bottomed in hard gray sand, top Markley sand 2,815 ft., top Domengine 4,133 ft., top Hamilton sand 4,823 ft., all sands barren, drilled in search of commercial gas production, TD 5,000 ft.

TEXAS GULF COAST

Provident City Pool Extended Northeast

HOUSTON.—The Provident City pool in Lavaca County has been extended more than a mile to the northeast by Shell Oil Co., Inc. 3 F. W. Neuhaus, which flowed 3,000,000 cu. ft. of gas per day through a ¼-in. choke with 52 bbl. of condensate, ratio 58,000 to 1, TP 2,100 psi. CP 2,300 psi., through five sets of perforations from 8,590-8,795 ft. in a large Wilcox sand section. Total depth is 8,800 ft.

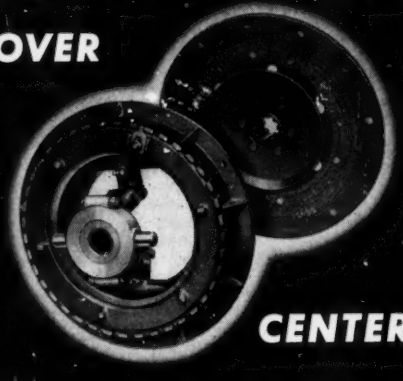
Cities Service Oil Co. 1 G. F. Krider, 3,100-ft. extension test to the Ramsey field of Colorado County, is being completed, flowing at the rate of 3,900,000 cu. ft. of gas daily, condensate not gaged, through a ⅜-in. choke with TP 1,400 psi. Total depth is 9,598 ft., and the 5½-in. casing is cemented to 9,205 ft. Production is through perforations at 8,862-73 ft.

The Hamel field, Colorado County, was extended 1,320 ft. west of the discovery well by Skelly Oil Co. 2 Berthold, which flowed oil through 71 perforations at 9,059-71 ft. Gage has not been made on the flow. Total depth is 9,211 ft., and the 5½-in. casing is set at 9,151 ft.

Houston Oil Co. of Texas 1 Houston Oil Co. and American Republics fee, in the Thomas Penny Survey, Abstract 424, approximately 3 miles southwest of nearest production in the Village Mills field of Hardin County, had another showing of gas and condensate and is being cored ahead just below 8,985 ft. A 45-minute test made from 8,937-70 ft., blew out the water cushion after 10 stands were pulled and recovered six additional stands of water cushion and rathole mud cut with gas and condensate. A test made last week from 8,928-40 ft. showed gas and condensate.

ROCKFORD

OVER



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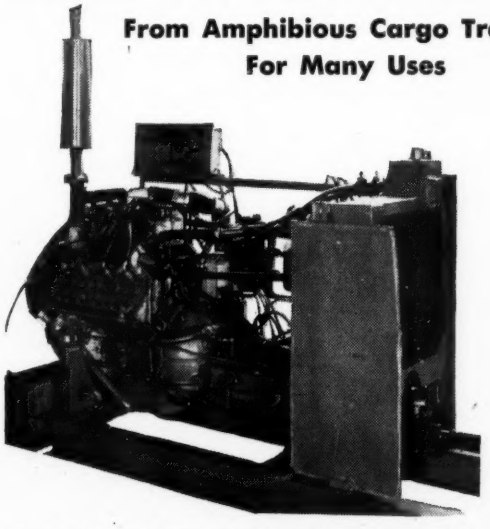

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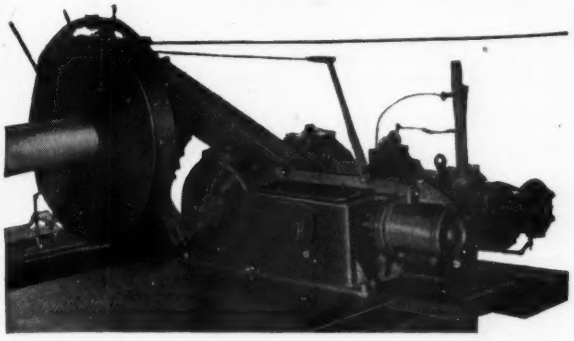

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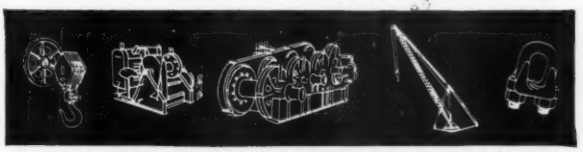


HOISTS • DERRICKS • BLOCKS • SHEAVES • CROSBY CLIPS

Fourteen new locations this week included five wildcats, two in Fort Bend and Harris counties, and one in Polk County. Three producers in proven areas were completed, one each in Redfish Reef field, Chambers County, South Liberty field in Liberty County, and Provident City field in Lavaca County.

APPALACHIAN FIELD

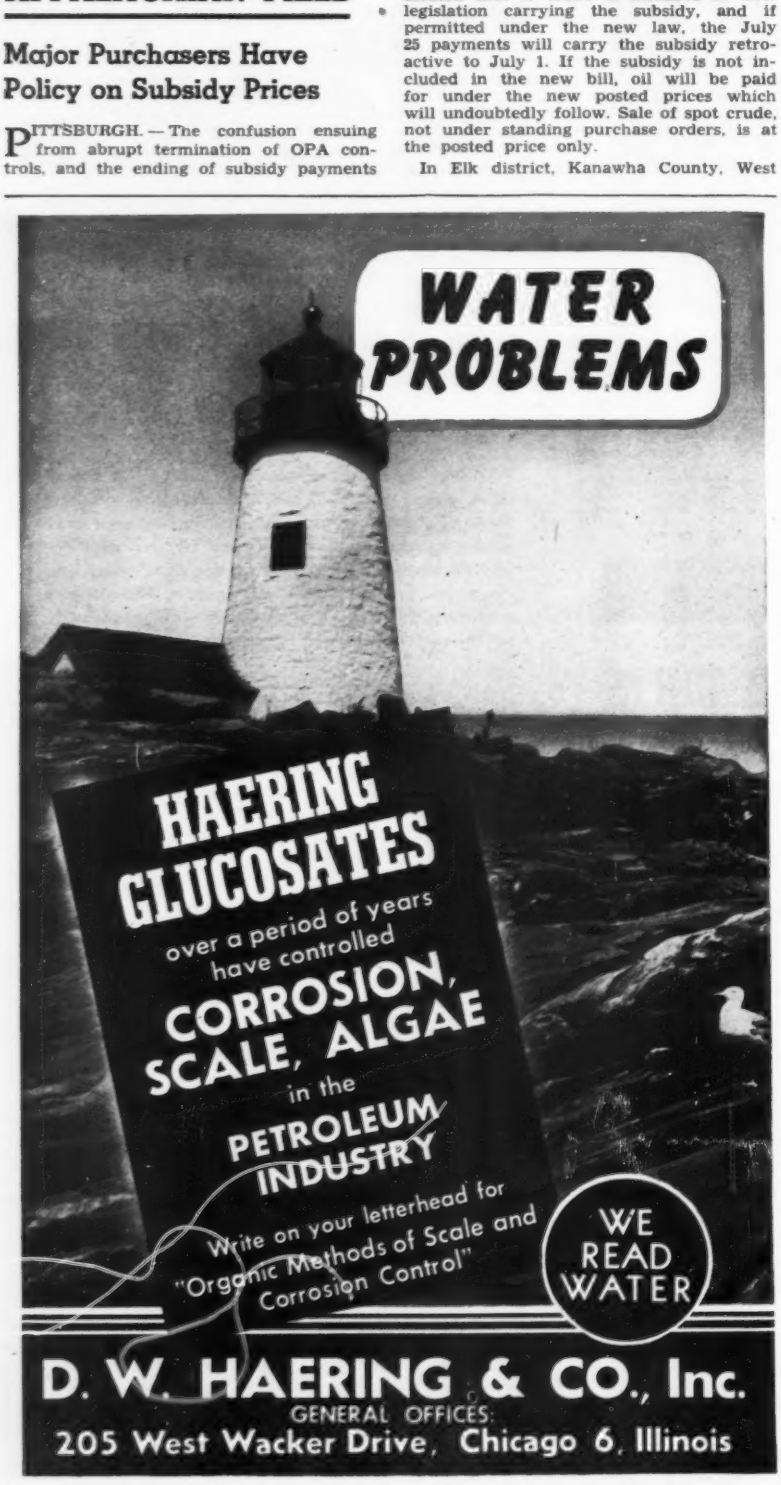
Major Purchasers Have Policy on Subsidy Prices

PITTSBURGH. — The confusion ensuing from abrupt termination of OPA controls, and the ending of subsidy payments on crude after June 30, has settled to a fairly stabilized policy which the major purchasers of Penna Grade crude appear to be following. Most operators sell on standing purchase orders which carry the price as of the day run. The oil is then paid for 10 days after the total runs during the first half of the month and again of the second half. Thus for July, oil run up to and including the 15th will be paid for by July 25. These purchasers have indicated that if crude is included in new legislation carrying the subsidy, and if permitted under the new law, the July 25 payments will carry the subsidy retroactive to July 1. If the subsidy is not included in the new bill, oil will be paid for under the new posted prices which will undoubtedly follow. Sale of spot crude, not under standing purchase orders, is at the posted price only.

In Elk district, Kanawha County, West Virginia, in the Oriskany extension to the Elk-Poca field, United Carbon Co. completed No. 1,326, the second test on the R. A. Marshall lease, gaging 9,248,000 cu. ft. natural; elevation 859 ft., Oriskany 5,129-57 ft., rock pressure 1,500 lb. 24 hours, total depth 5,157 ft. Glen Dearth completed a test on Roxalena Acree farm good for 4,726,000 cu. ft. gas after shooting the Oriskany; elevation 894 ft., Oriskany 5,188-5,272 ft., lime break 5,240-53 ft., shot 5,198-5,277 ft., total depth 5,277 ft. Columbian Carbon Co. 871 D. W. Hughes appears to be a failure. With elevation of 894 ft. it had Oriskany at 5,141 ft., showing 15,000 cu. ft. gas and 1 bbl. oil at top of the sand, salt water 5,166 ft. It is drilling at 5,191 ft.

In Falls district, Fayette County, Columbian Carbon Co. completed 899 of No. 9 Gauley Mountain Coal Co. as a Big Lime gas well gaging 2,157,000 cu. ft. after acidizing.

In Salem Township, Mercer County, Pennsylvania, the Silurian test of Hart & Hickman on the Herman K. Smith farm is being plugged and abandoned. The Onondaga lime was topped at 3,188 ft., Oriskany with salt water 3,419-25 ft., Red Medina 4,765 ft., White Medina 4,795 ft., Queenston shale 4,954 ft. Oil at 4,782 ft. was followed by salt water.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CANADIAN FIELDS

Turner Valley Gets Good Well

CHATHAM.—In Turner Valley north extension, Foothills Oil & Gas 24, LSD 15, 4-21-3w5, finished in Madison lime at 8,140-8,666 ft., and after final acidizing flowed 86 bbl. an hour on a 4-hour test, with oil-gas ratio of 1,210 cu. ft. Foothills 25 has made a location in LSD 6, 9-21-3w5, a half mile north and west. Three other tests are drilling in Turner Valley.

Provost.—In the Provost area, eastern Alberta, Imperial-Provost 1, LSD 3, 27-37-3w4, finished at 2,549 ft., is making 40 to 50 bbl. of 28°-oil on continued tests. Imperial 2 has location in LSD 1, 33-37-3w4, a mile north and slightly west of the discovery.

Antelope Hills.—In the Antelope Hills area, eastern Alberta, Trans Alberta-Alliance 1, LSD 16, 19-20-1w4, bottoming at 3,930 ft. is drilling out cement to test two horizons at 3,575-3,615 and 3,770-3,810 ft. Good porosity with gas was indicated in the upper horizon while both zones had oil shows. Trans Alberta-Alliance 2, LSD 2, 18-20-1w4, a mile south of No. 1, is rigging with cable tools for a test of the Bow Island sand at 2,000-2,100 ft., which gave oil shows in No. 1, and the Madison contact, expected at 2,700 ft.

Ram River.—In the Central Alberta foothills, Ram River Oils 3, LSD 12, 1-37-11w5, bottoming at 4,745 ft., is redrilling to straighten below 2,858 ft. This test previously got showings of light crude in the Devonian limestone at depth. Ram River 4, LSD 9, 36-34-10w5, is below 1,308 ft.

Lloydminster.—In the Lloydminster field, eastern Alberta, Ponalta 3, LSD 8, 12-49-1w4, drilled in at 1,890 ft., is testing, with indications of a good producer. Sparky 3, LSD 15, 34-49-1w4, finished in 1944 at 1,912 ft. with 10 bbl. of 14-gravity crude, has been reconditioned and is pumping up to 60 bbl. On the Saskatchewan side of the field, Groat-Withers 3, LSD 5, 11-49-28w3, finished with oil sand at 1,861-64 ft., has close to 100 bbl. flush.

Gaspe.—In the Gaspe Peninsula, Quebec Province, Gaspe Ventures 1, on the Galt anticline, is reported below 547 ft. in a sandstone and shale formation. Gaspe Oil Ventures, Ltd., of Montreal, which is sponsoring the well, has also acquired a 50 per cent interest in the unfinished Continental Petroleums, Ltd. 1 on the Galt Brook Dome under an agreement to fi-

nance completion from the present depth of 2,137 ft. to a maximum of 8,000 ft. Work has been started on the camp and drilling equipment is being moved in.

N. CENTRAL TEXAS

Stain, Oil Odor Reported In Montague County Wildcat

WICHITA FALLS.—Bennett & Sorrels 1 C. W. Milton et al, Section 13, Titus County School Land, Montague County wildcat 6 miles east of Sunset, was cored from 7,853-51 ft. Recovery was 18 ft. of hard dolomite lime with slight stain and odor of oil. It was being deepened below 7,978 ft.

Continental Oil Co. 2 O. B. Barron, William Bartee Survey, Abstract 30, 2 miles southwest of Bowie, Montague County, ran a drill-stem test from 6,728-77 ft. There was gas in 30 minutes. Recovery was 655 ft. of oil and 65 ft. of oil and gas-cut drilling mud. It was drilling below 6,924 ft. in the Simpson.

Continental Oil Co. 1 Durham & Kempner, Charles O'Connor Survey, Jack County wildcat 3 miles southeast of Cundiff, is dry at 6,660 ft. in lime. Ellenburger was topped at 6,532 ft. Continental will drill a 6,500-ft. wildcat in central Clay County, 16 miles northeast of Blue Grove. It is 1 C. E. Crump, 990 ft. from the north line and 330 ft. from the east line of Block 45, Grayson County School Land.

Standard Oil Co. of Texas 1 A. J. Mitchell, J. B. McNair Survey, scheduled 10,000-ft. wildcat 1½ miles northwest of Sherman in Grayson County, cored from 9,221-24 ft. and recovered 3 ft. of dolomite. It was drilling below 9,230 ft. in lime. Denver Producing & Refining Co. 1 Rich, I&GN Survey, Abstract 1439, another deep wildcat in Grayson County 7½ miles northwest of Gordonville, was drilling below 7,390 ft. in sandy shale.

Electra field, Wichita and Wilbarger counties, had five completions this week. Wilson field, Cooke County, had three, and Gatewood field, Cooke County, and Hildreth field, Montague County, each had two. Electra field had five locations, and Almon and Wilson fields, Cooke County, and Thomas and Holliday fields, Archer County, each had one.

In West Central Texas, Wimberly field, Jones County, had one completion. Jones County Regular field and Stephens County Regular field each have one location. Silver Valley field, Coleman County ,Lewis Steffins field, Jones County, and Jones County Regular field each have three drilling wells, and Cisco field, Eastland County, Loving field, Stephens County, and Reddin field, Taylor County, each two.

NORTH CENTRAL TEXAS SUCCESSFUL WILDCATS

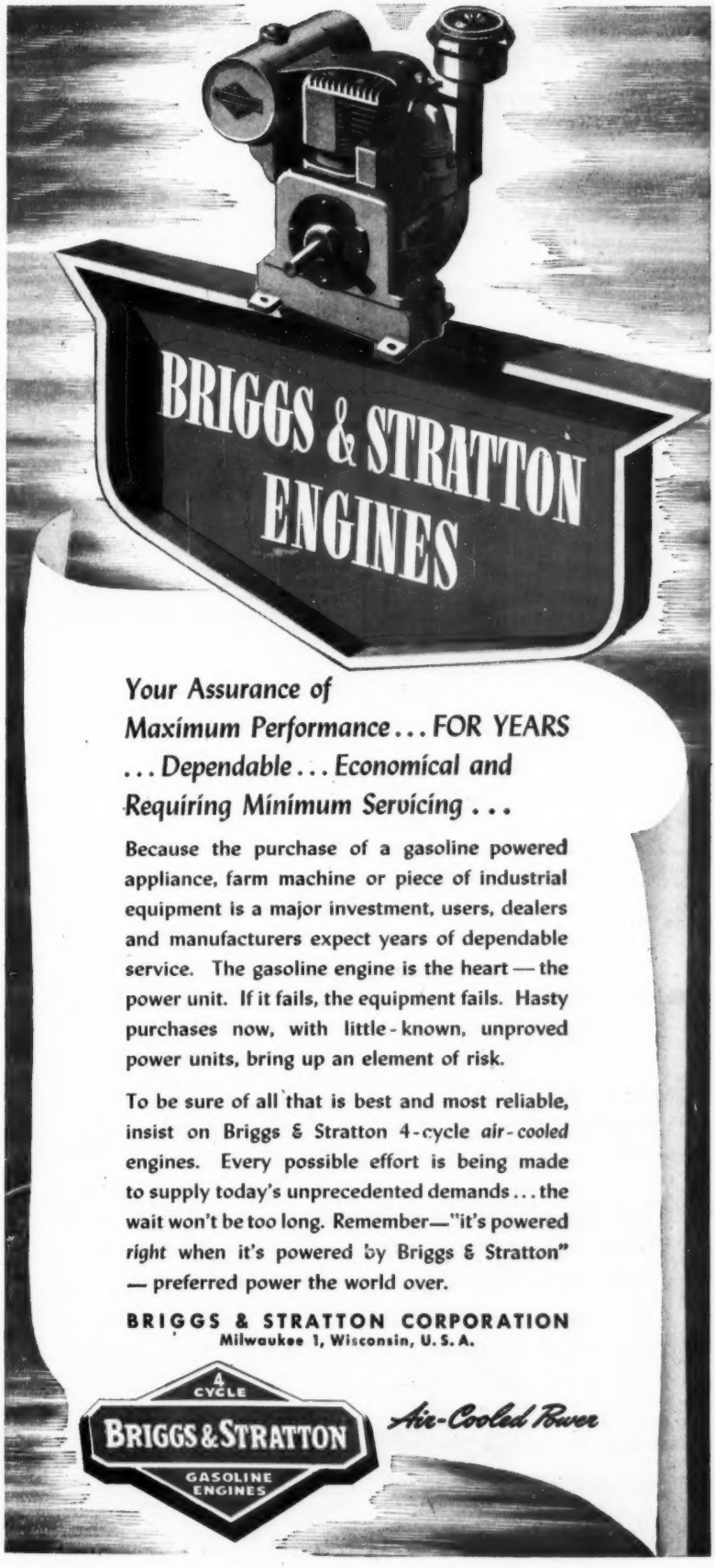
Archer County: New oil pool—Cochran & Cain 2 Virgil Seay, Lot 69, Harris Subd. Club Ranch, 6 mi. W Archer City, elev. 1,019 ft., pumped 10 bbl. day, perf. 1,148-56 ft. Cisco, gravity 35°, TD 1,159 ft.

Knox County: New oil pool—Cities Service 1 Doris Mulkey, Sec. 163, Blk. 14, H&TC Sur., 2 mi. S Truscott, elev. 1,569 ft., pumped 10 bbl. day, perf. 6,224-40 ft. Bend, gravity 48°, TD 6,785 ft.

Wilbarger County: New oil pool—National Assoc. 1 C. Schomker, Sec. 11, Blk. 14, H&TC Sur., 6 mi. SE Vernon, elev. 1,273 ft., flowed 337 bbl. day through 14/64-in. choke, perf. 3,510-27 ft. Canyon, gravity 37°, TD 5,728 ft.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: Harvey Drlg. et al 1-K Luther T. Key, Lot 43, J. W. Harris Subd. Club Ranch, 8 mi. SW Archer City, dry, TD 1,451 ft.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Wichita County: Akin & Dimock 1 Eugene Sherrod, League 4, Blk. 2, Denton CSL, 2 mi. N and E Holliday, dry, TD 1,353 ft.

Bell Oil & Gas 1 A. Kaspar, BS&F Sur. A-334, 2 mi. W and ½ mi. N Clara, elev. 1,109 ft., Ellenburger 3,050 ft., dry, TD 3,069 ft.

Fortex Oil Corp. 1 Roller, Sec. 3, CTRR Sur., 3 mi. N and 2 mi. W Bacon, dry, TD 1,701 ft.

H. R. Theck 1 Covington, Sec. 20, H&GN Sur., ½ mi. N Fowlkes, dry, TD 1,772 ft.

Wilbarger County: S. H. Fagadau 1 W. T. Waggoner, H&TC Sur., 2 mi. E and 4 mi. N SE corner county, elev. 1,120 ft., dry, TD 1,850 ft.

Young County: W. F. Palmer 16-B Campbell, Sec. 1390, TE&L Sur., 6 mi. W and 2 mi. N Olney, elev. 1,127 ft., dry, TD 928 ft.

SOUTH LOUISIANA

Magnolia Opens New Pool In Oretta District

NEW ORLEANS.—Another new Cockfield producing area, in the Oretta district, Beauregard Parish, has been opened by Magnolia Petroleum Co. 1 Powell Lumber Co., in 17-16s-11w, 2 miles northwest of the North Oretta discovery and approximately 3½ miles north of westerly production in Oretta field proper. The well made a potential flow of 85 bbl. of 43°-gravity clean oil in 24 hours through a 7/64-in. choke with 1,250 lb. flowing pressure on the tubing and a gas-oil ratio of 1,231 to 1.

Production is through perforations at 8,412-18 ft., total depth 8,800 ft., and 5½-in. casing is cemented to 8,510 ft. This is Magnolia's third discovery in Beauregard Parish this year, others being North Oretta and Singer.

Shell Oil Co., Inc. has two new sand discoveries. In Iberville Parish, 23 Wilbert in 8-11s-12e, Whitecastle field, flowed 195 bbl. of 31° oil through perforations at 7,311-20 ft. Flowing pressures are 1,100 lb. on tubing and 1,180 lb. on the casing, gas-oil ratio 445 cu. ft. At La Pice field in St. James Parish, Shell 4 Mrs. Henry Schexnayder in 38-12s-15e, opened a new sand at 9,716-29 ft., flowing a potential of 176 bbl. of 33° oil, TP 950 psi., CP 1,100 psi., gas-oil ratio 376 cu. ft. Total depth is 9,962 ft. and the 5½-in. casing is cemented at 9,882 ft.

Gas-condensate production has been extended ½ mile southeast at Union Oil Co. of California 1 R. R. Barrow, Inc., 1-17s-18e. Drilled to a total depth of 10,498 ft., well flowed gas-condensate through perforations at 10,310-318 ft. Operators are waiting on surface equipment before making a gage. The 5½-in. casing is cemented to 10,402 ft.

Sohio Petroleum Co. 3-B Claudius Fontenot, a ¼-mile south outpost test in Bon Air field area of Jefferson Davis Parish, 15-10s-6w, has been completed higher in the same sands than the three presently producing wells. The well gaged 186 bbl. in 24 hours through a ½-in. choke, TP 1,325 psi. flowing, gas-oil ratio 552 cu. ft. Total depth is 9,760 ft. and perforations are from 9,680-86 ft.

Sohio 1-A W. L. Trimble, SE NW 2-8s-4w, a wildcat test west of present production in the China field area of Jefferson Davis Parish, has been completed dry at 9,598 ft. after failing to show for production at three different levels. On initial test at 9,174-80 ft. the well failed to flow, and swabbed dry. On another test from 9,180-86 ft. it showed salt water. Another test was made up the hole.

At West Cote Blanche Bay, The Texas Co. 24 State has been compieted at 9,026-41 ft. for an initial gage of 243 bbl. through a ½-in. choke with TP 1,350 psi, flowing. Total depth is 10,676 ft. with 7-in. cemented to 10,149 ft. The deep sands failed to show for commercial production.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Beauregard Parish: New oil pool—Bilbo field, 2 mi. NW of N. Oretta field—Magnolia Petroleum Co. 1 Powell Lbr. Co., 17-6s-11w, top Cockfield sand 8,412 ft., perf. 24 holes 8,412-18 ft., TD 8,800 ft., PT 85 bbl. per day through 7/64-in. choke, gas-oil ratio 1,231 cu. ft., TP 1,250 lb., gravity 43.9°, no water.

Iberville Parish: New oil sand, White Castle field—Shell Oil Co. 23 Wilbert, 8-11s-12e, TD 7,563 ft., top sand 7,310 ft., perf. 36 holes 7,311-20 ft., PT 195 bbl. per day through 8/64-in. choke, gas-oil ratio 445 cu. ft., TP 1,100 lb., CP 1,180 lb., gravity 31°, 0.1 per cent water.

St. James Parish: New oil sand, La Pice field—Shell Oil Co., Inc. 4 Mrs. Henry Schexnayder, 38-12s-15e, TD 9,962 ft., top sand 9,715 ft., perf. 92 holes 9,716-29 ft., PT 176 bbl. per day through 8/64-in. choke, gas-oil ratio 376 cu. ft., TP 950 lb., CP 1,100 lb., gravity 33°, 0.1 per cent water.

EASTERN TEXAS

Hunt Oil Co. Wildcat Drilling Below 9,750 Ft.

DALLAS.—Hunt Oil Co. 1 Andrews, Jose Pineda Survey, Abstract 40, wildcat 7 miles south of Laressa, Cherokee County, topped the Travis Peak at 9,655 ft. On a core from 9,680-95 ft. recovery was hard, tight, silty sand with no shows. It was drilling below 9,750 ft.

Humble Oil & Refining Co. will drill a wildcat in Houston County, 3½ miles east of Crockett. It is 1 C. W. Legory, 50 ft. northeast of the southwest line and 2,257 ft. southeast of the northwest line of Francis Hill Survey. The test will be drilled to 7,500 ft., but it is reported that the company may carry the well to 13,000 ft. if necessary. A new Travis Peak wildcat for Van Zandt County is Delta Drilling Co. et al 1 B. J. Houston. It is 2,000 ft. from the south and west lines of the A. L. Martin Survey, 1¾ miles northeast of Martin's Mill.

Humble 1 Dowell, William Saunders Survey, in the Mount Sylvan pool of Smith County, topped the Pecan at 3,178 ft., 36 ft. lower structurally than the discovery

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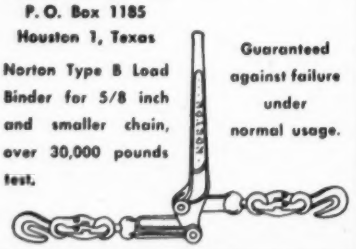

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well. Rogers Lacy 1 Baker, Alexander Albright Survey, 2½ miles northeast of wet gas production in the Whelan pool of Harrison County, was being deepened to the Pettit after drill-stem test of the Rodessa zone at 6,810 ft. showed salt water.

Carthage field, Panola County, and Merigale field, Wood County, had two completions this week. Hawkins field, Wood County, had three locations and Carthage field had two. Carthage field has 32 drilling wells; Hawkins field, 23, and New Hope field, Franklin County, and Sand Flat field, Smith County, each 5.

EASTERN TEXAS WILDCAT FAILURES

Anderson County: Humble 1 Freeman, John Little Sur., 2½ mi. S and slightly E Brushy Creek, elev. 562 ft., James 11,660 ft., Pettit 12,320 ft., Travis Peak 12,520 ft., dry, TD 12,686 ft.

Cherokee County: T. G. Shaw 1 Margaret Tilley, Chas. L. Widgeon Sur., 3¼ mi. SW Summerfield, elev. 302 ft., Woodbine 4,188 ft., dry, TD 4,479 ft.

Hill County: Robt. M. Bass 1 John Gerek, John Gerek Sur., 3 mi. NW West, dry, TD 1,013 ft.

MICHIGAN

Single Producer Reported In 16 Michigan Completions

SAGINAW.—Michigan oil and gas operators drew blanks on all but one of the 16 completions recorded for the week, the lone producer being Pure Oil Co. A-3 State-Lyon, Section 7 of Lyon Township, Roscommon County, acidized for 71 bbl. a day at 4,483 ft.

Eight of the 15 dry holes were wildcat tests. Eighteen new locations were announced in 11 counties. The completions included three Muskegon Development Co. operations in Section 29 of Foster Township, Ogemaw County, which have been temporarily abandoned at 800 ft.

Last of the wildcats added to the failures list was the Rowmor Corp. 1 Bork in Fremont Township, Saginaw County. It got a fair show of oil, but the few barrels production ran out a few days after acidizing the test which was drilled to 3,155 ft., plugged back to 3,143 ft. for testing.

Five of the new locations are in Newaygo County, two each in Goodwell and Norwich townships, the other in Big Prairie. Two each are set for Allegan, Bay, and Van Buren, the others in Barry, Isabella, Shiawassee, Montcalm, Mecosta, Missaukee, and Kent.

MICHIGAN WILDCAT FAILURES

Allegan County, Watson Township: Del Fortney 1 Pike & Rush, SE NE SW 25-2n-12w, dry in Traverse limestone, TD 1,591 ft.

Arenac County, Lincoln Township: Sohio Petroleum-C. W. Talbot 1 Ed Brennon, SE NE SE 14-18n-4e, dry in Dundee, TD 2,930 ft.

Barry County, Yankee Springs Township: Superior Oil 1 John Kotrba, SW NW NW 30-3n-10w, dry, TD 2,012 ft.

Ogemaw County, Churchill Township: Sun Oil 1 Nelson Grezeszak, C SW 2-22n-3e, dry, TD 1,536 ft.

Edwards Township: Cities Service Oil 1 Catherine Hickey, SE SE SE 8-21n-1e, dry in Dundee, TD 3,643 ft.

Ottawa County, Jamestown Township: Clawson Development 1 Nicholas Kiekover, NW NE NW 32-5n-13w, dry in Traverse limestone, TD 1,651 ft.

Zeeland Township: Arthur J. Boeve 1 Stellkamp & Brandt, NW NW SE 36-5n-14w, dry in Traverse limestone, TD 1,650 ft.

Saginaw County, Fremont Township: Rowmor Corp. 1 R. O. and E. C. Bork, NW SE NW 3-11n-2e, dry in Dundee, TD 3,155 ft., plugged back to 3,143 ft.

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ROCKY MOUNTAIN

New Pay Zone Indicated For Rangely Field

DENVER.—Testing of a new pay in the Rangely field, western Colorado, in Continental Oil Co. 2 Dorothy Rooth C SW SW 15-2n-103w is an outstanding development of the week. The well is a south offset to same company's 1 Rooth, completed last March at 6,816 ft. for 864 bbl. initial, which was an outpost on the west side more than a mile ahead of production. While it was a good well, it yielded geological information as to the probable limits of the field in that direction. At first, it gave some indications that the axis of the anticline may have been located farther south than originally mapped, but when the south offset ran lower on the Dakota, this theory was discarded. However, 2 Rooth ran into a new factor. It picked up a sand at approximately 6,098 ft. and was drilled to 6,110 ft. (cor.) when it blew in making gas and spraying oil under heavy pressure. The well then was killed and drilling to the Weber was resumed. It was decided to run an intermediate string of pipe to protect the hole, but the continued pressure resulted in a change in the plans. Reaming began with the intentions of landing the 9⅝-in. on top of the sand and making a test. However, the pressure was so great that difficulties were encountered and the pipe was set at 5,966 ft., leaving more than 100 ft. of open hole above the sand. When the plug was drilled, the well kicked off, and flowed 133 bbl. the first hour. Then it began sanding up and made an average of 73 bbl. per hour for the next six hours. The oil was of a higher grade than found in the Weber sand and runs between 38 and 39 degrees gravity. The tubing then was pulled to clean out and probably will be reset higher in the hole. The sand subsequently was identified as being in the Shinarump conglomerate of Triassic age. This formation is known to be present over a large area extending into northwestern New Mexico, northeastern Arizona and southwestern Utah, and at some places, especially on the Boundary Butte structure, has shown a good sand. This is the first time the sand has been encountered in the Rangely field, although the electric log showed a slight indication of gas at this level in the well to the north. The full significance of the discovery will not be apparent until further testing takes place, but the evidence points to important possibilities.

Big Sand Draw blowout.—Sinclair-Wyoming Oil Co. 3 Sand Draw Unit, SW SE SE 10-32n-95w, Big Sand Draw field, Fremont County, Wyoming, topped the Embar sand at 6,645 ft., and when tools were pulled it blew in making an estimated flow of 25,000,000 cu. ft. of gas per day and spraying oil. It was not brought under control until the next day, and then drilling to the objective Tensleep was resumed. The showing points toward important developments in this field which produced gas only in large quantities from the Frontier and Dakota sands prior to an oil discovery in the deeper Tensleep sand in December 1944. The discovery well in SW NW NW 14-32-95, had the Embar at 6,896 ft., and in a drill-stem test at 6,896-6,913 ft., open 57 minutes, had a recovery of 1,560 ft. of oil, 633 ft. of oil-cut mud and 90,000 cu. ft. of gas. However, drilling continued to the Tensleep, topped at 7,285 ft., and drilled to 7,593 ft., where it was completed flowing 1,300 bbl. of 35.5°-gravity oil in 16 hours through tubing and casing. The second well, a north offset, was drilled last year and made only 392 bbl. in 24 hours from the Tensleep. It ran into a fault in the Embar and redrilled 150 ft. of that formation, the Tensleep running approximately 600 ft. lower than in the discovery. No. 3, located west of No. 2 and nearly ½ mile northwest of the discovery, is running 311 ft. higher on the Embar than to discovery. The three wells are the only ones drilled below the gas sands in upper horizons.

New operations.—Twelve new operations were reported, of which six were in Colorado, five in Wyoming, and one in Montana. Five of the Colorado locations were in the Rangely field and one is a wildcat in Moffat County. The Wyoming locations included one each in Cow Gulch, Hat Six, and Big Polecat, wildcats, and one each in Garland and East Lance Creek.

The Moffat County wildcat is Continental Oil Co. 1 Margaret V. Smith, SW SE SW 30-5n-98w, on the Elk Springs anticline which lies approximately 25 miles northeast of the Rangely field and the same distance northwest of Wilson Creek. The location is close to a well drilled in 1926 by Union Oil Co. of California which tested the Dakota series to a total depth of 3,973 ft. The Union well showed for approximately 9,000,000 cu. ft. of gas per day. The new test will go to the Weber, top expected at around 6,300 ft. Fred T. Manning, Inc., has the contract. The Cow Gulch wildcat is Intermountain Petroleum Co. 1 Government, NE NE NE 8-36n-62w. It is in an area where several tests had shows of black oil at shallow depths. The Hat Six test is 10 miles east of Casper and west of the Big Muddy field, in Natrona County, and is Yellowstone Drilling Co. 1 Government, NW NW NW 7-32n-77w. The Big Pole Cat test is Mule Creek Oil Co. 2 Government, NE NE SW 27-57n-98w, in Park County, on the same line of folding and 10 miles northwest of the Garland field. Several gas wells have been drilled to the Frontier at around 2,300 ft., making 2,000,000 to 3,000,000 cu. ft. per day. The Montana wildcat is Texas Co. 1 Sorrell, C NE NW 29-36n-6e, in the Sweetgrass Hills district in Liberty County.

Completions for the week were down to

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8, of which 5 were oil wells with initial production of 436 bbl., 1 was a gas well, and 2 were dry holes. The Wyoming completions included 1 at Garland for 350 bbl. and 1 at Steamboat Butte for 550 bbl. Rangely had one completion for 352 bbl. Montana had a 20-bbl. well in Kevin-Sunburst and a 144-bbl. well in Cat Creek. Hardin had one small gas well and Cat Creek and Flatwillow had two dry holes.

MONTANA WILDCAT FAILURE

Flatwillow, Petroleum County: George Brundage 1 Teague, SW NW 35-14n-25e, TD 1,503 ft., Ellis sand 1,378-1,410 ft., dry.

OHIO, KENTUCKY

Columbiana Co. Gas Extension Looks Good

COLUMBUS—Eberly et al reached the top of the Oriskany sand at 4,409 ft. on R. O. Green, Section 14, in 1-mile northeast extension to their discovery in Section 22, Madison Township, Columbiana County. Three feet in, they had 2,467,000 cu. ft. of gas and lost their bit. They will drill through the sand when the bit is recovered.

The number of tools running in the Canton area is still increasing with eight additional locations this week and five completions.

Ohio Fuel extended the Spencer gas pool ½ mile southwest on W. W. Leiby, Section 24, Homer Township, Medina County. The Clinton at 2,724-31 ft. gaged 375,000 cu. ft. natural with 1,040 lb. pressure.

Allen Willey found gas in the Cennamon while drilling on R. S. Frazier, Third Quarter, Newton Township, Licking County. Small pays from 920-1,298 ft. were shot with 280 qt., and 18 hours later the well was shut in at 319,000 cu. ft.

H. B. Walker 4 H. R. Cook, Section 2, Bedford Township, Meigs County, made 10 bbl. natural and flowed 35 bbl. after shot.

A new peak of 40 locations was reported this week. Sandyville led with nine, followed by Lancaster and Cambridge with seven each, Stewart six, Ashland five, and Mt. Vernon and Brush Creek three each.

Twenty-five wells were completed with Lancaster in the lead with seven.

OHIO WILDCAT FAILURES

Knox County, Jackson Township: F. Colville 1 Margaret Hogle, Sec. 25, Clinton 2,680-2,710, 2,723-27 ft., TD 2,760 ft.

WESTERN KENTUCKY

OWENSBORO.—Only three oil wells and one gas well were reported as completed in the Western Kentucky area during the past week. None were wildcats. New operations announced during the week totaled five, and included two each in Henderson and Union counties, and one in Ohio County.

Exploratory work is at a low ebb with very few wildcats drilling at the present time. One of the most recent to be started is the California Co. 1 Spears, 13-L-57, Lincoln County, which will be carried down to the granite, the depth of which is unknown for this area. It is currently fishing for reamer lost at 259 ft., with 20-in. surface casing set to 168 ft.

INDIANA

EVANSVILLE.—Indiana exploratory activity continued at routine stages of drilling throughout the past week with no important showings reported in any of the several tests under way at the present time. In Gibson County, the Continental Oil Co. 1-D Cooper Estate, SW SW 13-3s-14w, is drilling ahead below 5,301 ft., while the C. R. Craft 1 Ireland, NW NW SE 14-1s-10w, is shut down for repairs at 1,790 ft.

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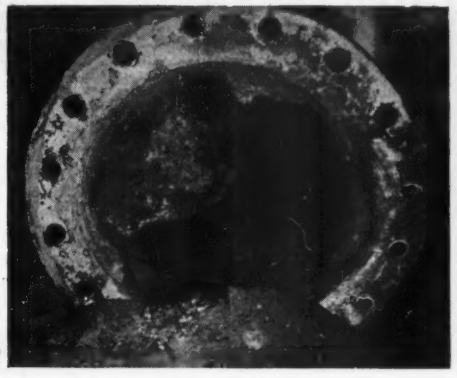

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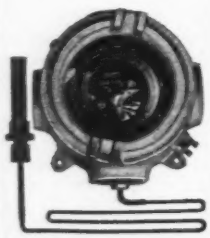

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In Posey County, the Carter Oil Co. is fishing at 2,521 ft. at the 1 John Larkin, SE NE SW 17-6s-14w.

Nine wells were completed during the past week, five as oil wells and the remainder as dry holes. No wildcat completions were reported. New operations announced during the week totaled seven, three each in Gibson and Posey counties and one in Pike County. No new wildcat tests were reported.

OKLAHOMA

New Deep Oil Sand Found In Chitwood Pool

MAGNOLIA PETROLEUM CO. has apparently found a new deeper sand in the Chitwood pool of Grady County, and preliminary tests indicate that the formation may produce oil instead of the gas and distillate which was found in the first two wells in the pool. The Magnolia 1 Spiers, SW SW 28-5n-6w, nearly a mile northwest of the discovery well of the area, recovered gas at the surface on a 3-hour drillstem test from 11,382-11,505 ft. When tools were pulled, the pipe contained 525 ft. of oil-cut mud and 15 ft. of 40°-gravity oil. Bottom hole pressure recorded at the end of 20 minutes was 1,350 lb. The 1 Spiers previously found salt water in the Cunningham zone and was drilled deeper to encounter the top of the new zone at 11,488 ft. Crew at present is conditioning mud at 11,481 ft.

Superior Oil Co. of California is making slow progress at about 9,200 ft. at the 1 Mary Howe, NW NW NE 11-8n-12w, an interesting wildcat near Fort Cobb in central Caddo County, and in the heart of the huge Anadarko basin. Slowness of drilling is due to company orders so that a careful study of samples may be made. Company officials are also contemplating drilling this test to the basement, expected at around 17,000 or 18,000 ft., if materials can be made to withstand such deep drilling.

Winona Oil & Gas Co. et al have opened a new oil field south of the Earlsboro pool in western Seminole County with their 1 Coesee, NW NE NE 29-9n-5e. This well swabbed 100 bbl. of oil in 24 hours following a 60-qt. shot in the Earlsboro sand, topped at 3,443 ft. Operators are now swabbing and cleaning out. The wildcat was originally drilled to 4,332 ft. in the Wilcox sand, but was plugged back to 3,550 ft. when that formation yielded water.

Carter Oil Co. continued to test its 1 Mary Mottinger, NW SW 5-6n-3w, McClain County, throughout the past week end in an attempt to bring the well in and prove a second producing horizon for the new Iron Chapel field. On the first test, the well flowed 171 bbl. in 22 hours through a ½-in. choke before dying. After swabbing at the rate of 2 bbl. of oil an hour for the next 24 hours, the well started flowing again and produced 65 bbl. in 17 hours. On the latest test the well flowed 53 bbl. in 6 hours through a ½-in. choke before dying. Pay is the Hunton lime with casing perforated at 9,967-10,030 ft., total depth 11,006 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Cotton County: R. B. Farris et al 1 Wook Kah-Nah, SW NW SW 1-4s-11w, pumped 120 bbl. oil, shaley sand 1,316-28 ft., TD 1,328 ft.

Creek County: Bates & Springer 1 Lindsey, SE SE SW 26-15n-8e, pumped 115 bbl. oil, Inola 2,850 ft., Bartlesville 2,882-2,970 ft., Mississippi lime 3,450 ft., Woodford 3,664 ft., TD 3,785 ft.

Garvin County: Cities Service Oil Co. 1 Wallace "B," NW NW SW 18-3n-1w, flowed 740 bbl. oil per day through ⅜-in. tubing choke, Viola 5,020 ft., Bromide 5,130, first sand zone 5,260 ft. with

staining at 5,312-27 ft., Bromide 5,344-65 ft., TD 5,454 ft.

Neustadt 2 Grant, NW NE NE 25-1n-1w, pumped 195 bbl. oil, sand 785-95 ft., 944-85 ft., 1,646-78 ft., TD 1,700 ft.

Love County: California Co. 1 W. T. Wright, C NE NW 13-8s-1w, pumped 50 bbl. oil per day, sand 6,243-52 ft. and 6,256-60 with show of oil, TD 7,383 ft.

Okmulgee County: Nu-Enamel 1 Fleetwood, C SE SE 34-16n-13e, gas well, Dutcher sand 1,733 ft., TD 1,753 ft.

Pittsburg County: Public Service Co. of Okla. 1 Brown, C NW SW 5-7n-14e, gas well, Savannah 682 ft., Booch sand 1,907 ft., TD 1,954 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: J. B. Apperson 1-A Lile, SE SE SE 8-5s-1e, dry, TD 1,656 ft., Arbuckle 1,180 ft.

Cotton County: Bridwell Oil Co. 1 S. E. Shaw, SE NE SW 15-3s-11w, dry, TD 2,677 ft., sand 1,276 ft., Canyon lime 2,624 ft.

Greer County: Hunter Woodruff 1 J. F. Hahn, NE SW NW 7-6n-21w, dry, TD 1,309 ft., granite wash 1,020 ft.

Okfuskee County: J. H. Cullinan 1 Edwards, NE NW SW 5-12n-8e, dry, TD 4,464 ft., Woodford 4,232 ft., Hunton 4,255 ft., Sylvan 4,294 ft., dolomite 4,417 ft., second Wilcox 4,460 ft.

Pawnee County: Paul R. Nagle 1 Whaley, NW NW SE 15-23n-5e, dry, TD 3,115 ft., Layton 2,060-170 ft., Red Fork 2,970-90 ft., Inola 2,990 ft., Bartlesville sand 3,015 ft.

Payne County: Elliott & Leon Davis 1 Stewart, NE NW SE 12-18n-3e, dry, TD 2,438 ft., Perry 2,060 ft., Lola lime 2,323 ft., Osage Layton 2,415 ft.

Seminole County: Toklan Roy Corp. 1 Alama, NW NE SE 23-10n-7e, dry, TD 3,510 ft., Booch sand 3,433-74 ft.

ILLINOIS

Keenville Field May Be Extended to Northwest

MATTOON.—A ¾-mile extension to the northwest of the present producing area of the Keenville field, Wayne County, was indicated last week in the M. J. Mitchell 1 Keeler, NE SE SW 21-1s-5e. Pipe has been set on the McClosky lime at 3,118-24 ft., total depth 3,127 ft. No drill-stem test has yet been made, but cores and an electric log indicated commercial looking saturation in the McClosky.

Also in Wayne County, Deep Rock Oil Corp. have completed their discovery, the 1 Ulyses, NE NW NW 30-1n-6e, for 71 bbl. of oil daily from the McClosky at 3,151-57 ft. The well was drilled to a total depth of 3,178 ft. but was plugged back to 3,172 ft. when water was encountered. It was treated with 1,000 gal. of acid. The 1 Ulyses is in the West Johnsonville area and is an extension well of that area. Another recent extension to West Johnsonville, located in Section 25-1n-5e, is the only other producing well in the area. The discovery well, located in Section 24-1n-5e, was completed for 8 bbl. of oil daily and was designated as the discovery well of the West Johnsonville field. However, operators were never able to produce this well commercially and no real field has been developed in the area.

Pipe has been set for further tests of the Levias at 2,598-2,601 ft. and the McClosky at 2,606-11 ft. at the George Engle 1 Clint Guisewite, SW SW SE 23-1n-13w, Wabash County. A 1-hour drill-stem test of these formations recovered 380 ft. of oil and 90 ft. of oil-cut mud. Some saturation was also indicated in the Palestine sand at 1,730-60 ft., and alloy pipe has been set opposite this section. The 1 Guisewite is approximately 1½ miles north and slightly east of the Friendsville field.

Illinois completions showed a decided upward trend during the past week with 32 oil wells and 31 dry holes reported. Of these 16 were wildcats, only 1 of which was successful. New operations for the week totaled 37 and included 13 wildcats, continuing the increased tempo of exploratory activity in the state.

ILLINOIS SUCCESSFUL WILDCAT

Wayne County: Deep Rock 1 Ulyses, NE NW NW 30-1n-6e, pumped 71 bbl. oil, 1,000 gal. acid, McClosky 3,151-57 ft., TD 3,178 ft., PB 3,172 ft.

ILLINOIS WILDCAT FAILURES

Clinton County: H. Hibbard 1 V. Mahlandt, NW SW SE 25-3n-3w, dry at 1,570 ft., Ste. Genevieve 1,307 ft., Rosiclare 1,337 ft., Fredonia 1,349 ft.

Coles County: Y. E. Hildreth et al 1 J. B. Roberts, NE NE SW 9-13n-14w, dry at 500 ft., sand 395 ft.

Kuehne & Schultz 1 Miller, NE SE NE 26-13n-7e, dry at 2,067 ft., Glen Dean 1,661 ft., Cypress sand 1,822 ft., Renault 1,900 ft., Aux Vases sand 1,921 ft., Ste. Genevieve 1,969 ft., Rosiclare 1,978 ft.

Cumberland County: V. M. Schief 1 J. F. Lawson, NE NE NW 27-11n-7e, dry at 2,058 ft., Glen Dean 1,706 ft., Cypress sand 1,813 ft., Aux Vases sand 1,986 ft., Ste. Genevieve 2,025 ft., Rosiclare 2,036 ft., Fredonia 2,045 ft.

Effingham County: J. Lichlyter 1 F. Wheeler, NE SE NW 16-6n-7e, dry at 3,003 ft., Tar Springs 2,228 ft., Glen Dean 2,379 ft., Cypress sand 2,566 ft., Benoist sand 2,703 ft., Ste. Genevieve 2,833 ft., McClosky 2,919 ft., St. Louis 3,000 ft.

J. Lichlyter 1 A. Wendt, NE NE NE 16-6n-7e, dry at 2,890 ft., Aux Vases sand 2,797 ft., Ste. Genevieve 2,838 ft., Rosiclare 2,856 ft., McClosky 2,883 ft.

Jefferson County: Ashland Oil & Refg. 1 Brookman heirs, SE NE NW 17-1s-4e, dry at 2,863 ft., Glen Dean 2,200 ft., Hardinsburg 2,226 ft., Cypress sand 2,463 ft., Benoist sand 2,565 ft., Renault 2,628 ft., Aux Vases 2,638 ft., Ste. Genevieve

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My Shoe Size is.....

Name .....

Address .....

City..... State.....

2,712 ft., Rosiclare 2,730 ft., McClosky 2,765 ft., St. Louis 2,843 ft.

Ashland Oil & Refg. 1 L. Barnett, SE SE NW 17-1s-4e, dry at 410 ft.

Marion County: Texas 1 O. Wooters, NE NW SE 21-1n-2e, dry at 2,261 ft., Tar Springs 1,482 ft., Glen Dean 1,568 ft., Cypress sand 1,785 ft., Renault 1,911 ft., Aux Vases 2,002 ft., Ste. Genevieve 2,055 ft., McClosky 2,117 ft.

Ben Taylor 1 Brewer, NE SE SE 26-3n-2e, dry at 2,380 ft., Glen Dean 1,780 ft., Cypress sand 1,966 ft., Benoist sand 2,165 ft., Aux Vases sand 2,169 ft., Ste. Genevieve 2,239 ft., McClosky 2,295 ft.

Wabash County: Hayes Drlg. Co. 1 Fischer, SW NE NW 7-1s-13w, dry at 2,849 ft., Glen Dean 2,208 ft., Hardinsburg 2,240 ft., Cypress sand 2,475 ft., Benoist sand 2,580 ft., Renault 2,664 ft., Ste. Genevieve 2,740 ft., Rosiclare 2,773 ft., Fredonia 2,807 ft.

Washington County: Ben Taylor 1 Bauza, SW SE SW 6-3s-1w, dry at 1,477 ft., Glen Dean 1,056 ft., Cypress sand 1,260 ft., Benoist sand 1,420 ft.

Ideal Drlg. Co. 1 Posezkiewitz, SE SW NW 9-3s-2w, dry at 1,379 ft., Glen Dean 1,006 ft., Cypress sand 1,224 ft., Benoist sand 1,352 ft.

Wayne County: Sam Malis 1 C. Frederick, NE NW NE 17-1n-9e, dry at 3,303 ft., Glen Dean 2,639 ft., Cypress sand 2,858 ft., Renault 3,087 ft., Aux Vases 3,150 ft., Ste. Genevieve 3,196 ft., Rosiclare 3,218 ft.

Robinson & Puckett 1 Williamson Cons., NW NW NE 24-2n-8e, dry at 3,090 ft., Menard 2,214 ft., Glen Dean 2,458 ft., Aux Vases sand 2,965 ft., Ste. Genevieve 2,995 ft., Fredonia 3,030 ft., McClosky 3,036 ft.

KANSAS

Pawnee County Wildcat May Open New Field

THE J. M. Huber Corp. and Ben F. Brack 1 Rutherford, SW NE NW 8-20s-16w, showed prospects of opening a new oil field in Pawnee County during the past week when the hole filled 3,000 ft. with oil after plug was drilled on the Arbuckle at 3,823 ft. Previously, on a 30-minute drill-stem test at 3,816-23 ft., recovery was 1,260 ft. of oil. This new strike is located approximately 3 miles southwest of the Ryan pool and west of the Pawnee Rock pool.

Another wildcat showing for a pool opener at the close of the week was the Virginia Drilling Co. et al 2 Roberts, SW SW 14-21s-12w, Stafford County. Located about 2½ miles northwest of the Sittner pool, the 2 Roberts encountered oil shows in the Arbuckle lime, and the hole was bottomed at 3,551 ft.

Another wildcat commanding attention in Kansas at the present time is the Helmerich & Payne 1 Noel, SW SW SE 22-5s-21w, ¾ mile west of production in the Ray West pool of Norton County. Here a drill-stem test of the Arbuckle recovered oil and oil-cut mud with no water. Successful completion would extend the Ray West pool and probably account for increased activity in the area.

Anderson-Prichard Oil Co. has started testing at its new Marion County discovery well, the 1 Warkentine, SE SE NW 27-19s-1e, 2 miles northeast of the Bitikofer oil pool of McPherson County. Both oil and gas were encountered in the Mississippi lime in this well, with the gas flow estimated from 7,000,000 to 15,000,000 cu. ft. daily. Operators expect to complete the discovery as a combination oil and gas well.

KANSAS WILDCAT FAILURES

Graham County: Potash Co. of America 1 Waggoner, SW SW NE 36-6s-25w, dry, TD 4,287 ft., Kansas City 3,700 ft., stain of oil 3,759 ft. and 3,856 ft., conglomerate 4,172 ft., Arbuckle 4,287 ft.

McPherson County: Galva Oil, Gas & Industrial Co. 2 Borth, SW SW SW 29-19s-2w, dry, TD 3,025 ft., Kansas City 2,353 ft., Mississippi lime 3,000 ft.

Fawcett et al 1 McBride, NW SW SE 31-19s-2w, dry, TD 3,040 ft., Kansas City 2,378 ft., Mississippi lime 3,029 ft.

Norton County: Potash Co. of America 1 Bennett, SW SE SE 19-5s-23w, dry, TD 3,846 ft., Kansas City 3,397 ft., slight show of oil 3,446 ft., conglomerate 3,747 ft., Arbuckle 3,796 ft.

Pawnee County: J. M. Nuber Corp. 1 Blackwell, SW SW SW 23-22s-16w, dry, TD 4,097 ft., Kansas City 3,618 ft., with slight show of oil, conglomerate 3,967 ft., Arbuckle 4,066 ft.

Rooks County: Goodpasture Drilling Co. 1 Bice, NW NW SW 10-10s-17w, dry, TD 3,588 ft., Kansas City 3,235 ft., Simpson 3,505 ft., Arbuckle 3,521 ft.

Rush County: Sasnak Oil Co. 1 Kerbs, SE SE SE 11-17s-16w, dry, TD 3,630 ft., Kansas City 3,330 ft., conglomerate 3,553 ft., Arbuckle 3,618 ft.

Saline County: Dulah W. Geary 1 Beil, SW SE SE 17-14s-3w, dry, TD 3,763 ft., Kansas City 2,250 ft., Viola 3,560 ft., Simpson 3,663 ft., Arbuckle 3,749 ft.

MISSISSIPPI

Three Wildcat Tests Scheduled in Mississippi

JACKSON. — Mississippi wildcat activity continued its high pace last week with three new exploratory wells announced.

In Issaquena County, C. J. Burns and John S. Miller, with support money from Amerada, Sohio, Skelly, and Cities Service, will drill north of Vicksburg in NE NW 11-8n-3e.

In Wayne County, 14 miles south of Waynesboro, I. P. LaRue, independent operator of Jackson, let contract to Hewgley Drilling Co. for the 1 Robinson Land & Lumber Co. in NE NW 20-6n-6w. Location is on a farmout from Humble Oil & Refining Co.

In Madison County, Magnolia Petroleum Co., with Hunt Oil Co. contributing dry-hole money, will drill in SE NE 21-9n-3e.

Two wildcats of interest are the Roeser & Pendleton, Inc., 1 Columbus Lumber Co., NE NW 20-6n-6e, in Lincoln County, which was drilling below 8,030 ft.; and the Leake County test of Donald M. Reese 1 Denson, in NE NE SW 29-9n-6e, reported to be nearing contract depth of 5,500 ft. with no shows.

LA.-ARK.

Two South Arkansas Wildcats Showing Oil

SHREVEPORT. — Wildcat activity continued to be high in South Arkansas, with two wildcats showing oil and continuing testing. In Columbia County, Blain Dunbar's 2 Reed & Biddle, 34-19s-20w, flowed 79 bbl. of oil through ¼-in. choke at 5,605-28 ft. Austin E. Stewart's 1 Moore, 14-16s-25w, Lafayette County, was drilling at 1,100 ft. In Ouachita County, Lion Chemical Corp.'s 1 Wesson, 4-15s-19w, was drilling at 1,550 ft., and in Union County, Guy Mabee 1 Union Saw Mill, 31-18s-11w, was drilling at 4,371 ft.

In North Louisiana, a Bossier Parish depth record has been set by Barnsdall Oil Co.'s 1 Carter-Burton Unit, 26-23n-13w, which drilled ahead to 11,278 ft., about 2,000 ft. below any previous depth record for

that parish, and expected to reach Smackover lime soon. South Caddo's important wildcat, W. C. Feazel 1 Herold, 21-15n-16w, was drilling at 3,800 ft. Union Producing Co. continued testing its wildcat, 1 Belgard, 14-4n-3e, in the Big Island area of Rapides Parish, with hole bottomed at 10,215 ft.

Federal Gasoline Tax Receipts Drop in May

Federal tax collections on gasoline and lubricating oils declined considerably in May in comparison with last year's May receipts, but Texas reported record receipts are indicated for its fiscal year ending in late summer on the basis of collections for the first 10 months.

Total federal collections from gasoline taxes were $29,061,094 in May; $13,570,280, or 31.8 per cent under May 1945 receipts, according to the bureau of internal revenue in Washington.

Receipts from the federal lubricating oil tax amounted to $4,659,536 in May, or 53 per cent under the $9,924,-124 collected during the same period a year earlier.

Pipe line transportation tax for May was reported at $1,228,920, a decline of 22 per cent under the total of $1,585,845 in May 1945.

Texas' gasoline tax revenue, however, will set a new record high for the fiscal year ending August 31, according to George H. Sheppard, state comptroller.

Total Texas collections in the first 10 months ended June 30 were $55,-934,679, approximately 2 per cent over the entire preceding fiscal year's receipts of $54,922,734. The 1945-1946 gasoline tax income will be approximately $68,934,679, Sheppard estimated. This figure is $8,798,410 above the previous record year of 1941-1942.

Meanwhile, Missouri, which now enjoys the lowest state gasoline tax at 2 cents per gallon, was reported facing a campaign for an increase during the 1947 legislature. The state was described as confronted with either raising more funds or losing federal aid. On the basis of 1941 revenue, an extra cent per gallon would produce net revenue of some $7,000,000.

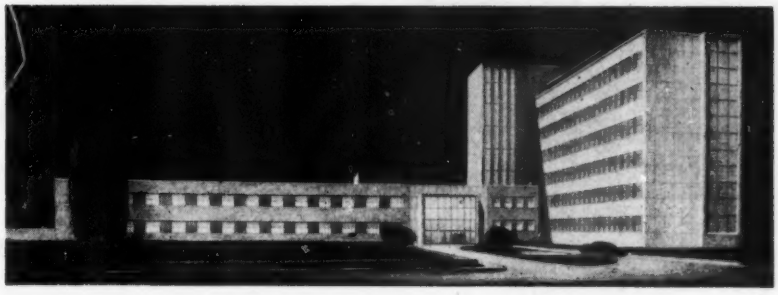
In Baton Rouge, La., the house of representatives killed a proposed $7 increase in vehicle license taxes, designed to raise an additional $3,000,-000 a year. Of the increase, $5 would have gone to parishes for their roads, and $2 to cities. Louisiana's license fee remains at $3.

Power Plant Use of Fuel Oil Sets Record

WASHINGTON.—Reflecting results of the now-settled coal strike, Federal Power Commission statistics show consumption of fuel oil in May for generation of electric power increased 62.9 per cent over April and set a new monthly record for this use of fuel oil.

Total consumption was 3,512,513 bbl. compared with 2,156,552 bbl. the previous month. With curtailed coal receipts and government-ordered conservation of bituminous coal supplies, power plants turned to the relatively more available fuel oil, FPC said.

Coal stocks of electric utility plants as of June 1 were 15.8 per cent less than stocks on May 1 and represented the lowest level since the summer of 1941, FPC said.



Construction of a new headquarters building for the Whiting, Ind., refinery of Standard Oil Co. (Indiana) will be undertaken as soon as conditions permit. The building will house the refinery's administration, engineering, and engineering research staffs. The new modern-design structure will be in Hammond, Ind., close to the 1,000-acre refinery in adjacent Whiting and immediately north of the Indiana Standard's research center now under construction. The administration and engineering building will be shaped somewhat like a T. The south part of the building, represented by the perpendicular part of the letter, will be two stories high. The north part will be six stories high, equipped with modern elevators. The north section of the building will be occupied by the administration division, including the management of the refinery, together with the accounting and marine departments and the engineering division. The engineering research laboratory will occupy the lower south section. Construction of the building is expected to require a year

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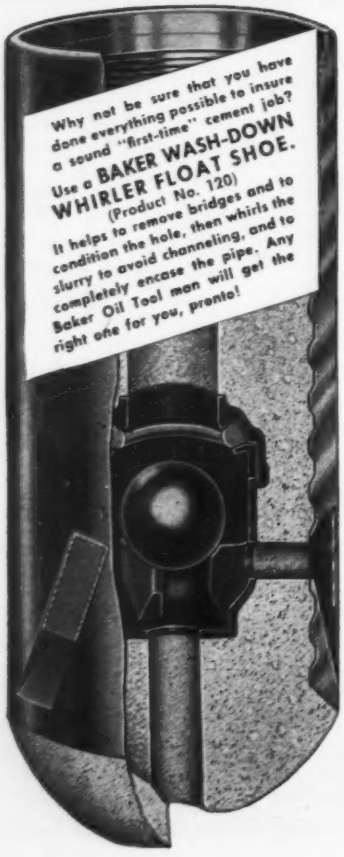
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Among the

Drilling Contractors

George & Wrather are contractors on the Tide Water Associated Oil Co. 3 Clifton Mack Partee, in SE SW 22-1s-12w, Gibson County, Indiana.

Callahan Drilling Co. (Ralph Callahan and E. L. Harbison) has purchased the equipment of A. D. Engle & Co., and is now running four clean-out and drilling-in units in Oklahoma.

Jones, Shelburne & Farmer, Inc., Oklahoma City and Great Bend, Kans., has been awarded the contract to drill a wildcat for Sohio Oil Co. in 31-17s-11w, Barton County, Kansas.

Cal G. Jones has the contract on the Port Rock Oil Co. 2 R. E. Cope and P. H. Axton, in NW SE 30-7s-6w, Spencer County, Indiana.

Olson Drilling Co., contractors on the F. A. Callery 1 Shaffer, in NW NW SW 1-7n-16w, Kiowa County, Oklahoma, had finished derrick and was moving in. Test is northeast of Gotebo.

Midwest Drilling Co., Calgary, Alta., has contract to complete the drilling of Northern Royalties 3, a deep test undertaken some time ago in the Kamsack shallow gas field in eastern Saskatchewan.

Harry Bass, Dallas, has the drilling contract on the Seaboard Oil Co. 1 James D. Jenkins, Section 27, Block D, L&SV Survey, a 7,500-ft. wildcat 7 miles north and slightly east of Lubbock, Lubbock County, Texas.

Vierson & Cochran, drilling contractors on the Wise & Douglas 1 Dudgeon, in NE NE NE 11-12n-10e, Okfuskee County, Oklahoma, topped the Hunton at 3,440 ft., had the Viola at 3,540 ft., and was drilling at 3,570 ft., looking for the Wilcox.

Hewgley Drilling Co. has been awarded drilling contract on the I. P. LaRue 1 Robinson, wildcat test in C NE NW 20-6n-6w, Wayne County, Mississippi. This test is a farmout from Humble Oil & Refining Co., 14 miles south of Waynesboro.

Delta Drilling Co., Tyler, Tex., has contract for the Benton & Weaver 1 W. D. McKenzie, in the Joel P. Woods Survey, Wood County, Texas. This wildcat is 2 miles northeast of Alba. Delta will also drill the Humble Oil & Refining Co. 1 C. W. Legory, a 7,500-ft. wildcat in the Francis Hill Survey, 3½ miles east of Crockett, Houston County, Texas, and the Central Pipe Line Co. 1 E. Bishop Mumford et al, in SE SE 24-3s-14w, Gibson County, Indiana.

H. H. & B. Drilling Co. holds contract on the Leon Derby, Jr., 1 Cornelius, in NE NW NE 9-6n-8e, in the Paulding area of Hughes County, Oklahoma. Surface pipe is set and well was drilling below 750 ft.

W. T. Rapp Drilling Co. holds contract on the J. A. Ligon 2 Davis, in C W½ SW NE 16-8n-8e, Seminole County, Oklahoma. Surface pipe was set at 100 ft. and well was drilling below 1,810 ft.

Zack Brooks, of El Dorado, Ark., has contract to drill a deep Paleozoic test in Pickens County, Alabama. The test will be C. H. Murphy, Jr.'s 1 R. E. Eaton, in NE SE 34-19s-16w.

Albert Shacklette, Jeffersontown, Ky., is the drilling contractor on the John W. Griest 1 W. H. and Carrie Hile, in NE NE 21-3s-6e, Floyd County, Indiana.

Ed Eads, Hazleton, Ind., is contractor on the W. L. Lichlyter 1A Ray Johnson, in NW SW 3-1n-9w, Pike County, Indiana. Contractor will also drill the W. L. Lichlyter 2 Gerald Wirey, in SE NE 9-1n-9w, Pike County.

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CALENDAR

July

Texas Railroad Commission, statewide proration hearing on August allowable, Austin, July 17.

Los Angeles Nomads, Seventh Annual Wing Ding and Golf Tournament, Riviera Country Club, Santa Monica, Calif., July 26.

Houston Nomads, Old College Inn, Houston, July 29.

August

Interstate Oil Compact Commission, quarterly meeting, August 8-10, Grand Rapids, Mich.

Houston Nomads, Old College Inn, Houston, August 12.

American Institute of Chemical Engineers, western convention, Palace Hotel, San Francisco, August 25-28.

September

Houston Nomads, Old College Inn, Houston, September 9.

Sixth annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va., September 9-11.

American Chemical Society, semiannual meeting, Chicago, September 9 to 13.

Pacific Coast Gas Association, annual convention, Fairmont Hotel, San Francisco, September 10-12.

Fourth National Chemical Exposition, sponsored by Chicago section, American Chemical Society, Coliseum, Chicago, September 10-14.

Los Angeles Nomads, Mayfair Hotel, September 11.

National instrument conference, sponsored by Instrument Society of America, William Penn Hotel, Pittsburgh, September 16-20.

National Petroleum Association, forty-fourth annual meeting, Hotel Traymore, Atlantic City, N. J., September 18-20.

National Lubricating Grease Institute, fourteenth annual meeting, Edgewater Beach Hotel, Chicago, September 29-October 2.

October

American Association of Oilwell Drilling Contractors, sixth annual meeting, Plaza Hotel, San Antonio, Tex., October 1-2.

American Institute of Mining and Metallurgical Engineers, Petroleum Division, annual meeting, Galvez Hotel, Galveston, Tex., October 3-5.

American Gas Association, annual meeting, Atlantic City, October 7-12.

Los Angeles Nomads, Mayfair Hotel, October 9.

Houston Nomads, Old College Inn, Houston, October 14.

Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 16-18.

American Institute of Mining and Metallurgical Engineers, Petroleum Division, annual meeting, Ambassador Hotel, Los Angeles, October 24-25.

American Association of Petroleum Geologists, midyear meeting, Buena Vista Hotel, Biloxi, Miss., October 24-25.

Independent Petroleum Association of America, annual meeting, Fort Worth, October 28-30.

November

Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa, November 7-8.

Houston Nomads, Old College Inn, Houston, November 11.

A.P.I. annual meeting, Stevens Hotel, Chicago, November 11-14.

American Society for Metals, annual meeting, and National Metal Exposition, Atlantic City, N. J., November 18-22.

American Welding Society, annual meeting, Atlantic City, N. J., November 18-22.

American Institute of Mining and Metallurgical Engineers, iron and steel division, and institute of metals division, annual fall meeting, Atlantic City, N. J., November 18-22.

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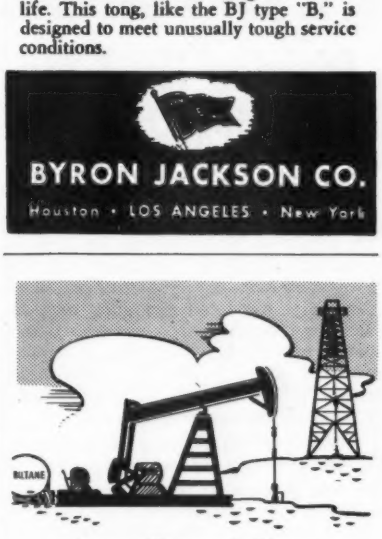

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Tulsa, Okla. . . . 3-6143
Perry, Okla. . . . 113
Hobbs, N. Mex. . . . 275-R
DAY OR NIGHT

PERSONALS

R. L. Keyes Becomes Division Head for The Texas Co.

R. L. KEYES, who came from California to New Orleans in 1941 as assistant division manager of the Louisiana-Arkansas division, The Texas Co., has been promoted to division manager it was announced last week by L. E. Barrows, Houston, manager of the producing department. Keyes is succeeding R. C. Stewart, who is retiring.

A native of San Diego, Calif., Keyes received his early education there. He was graduated from Pomona College in 1917 and later studied special courses at the University of California and Columbia University.

He served 18 months in the Army during World War 1 and was discharged at Fort Sill, Okla., as a second lieutenant. Entering the oil business in 1919, he did geological work in Oklahoma, Texas, New Mexico, and Kentucky.

In 1928, he entered the employ of The Texas Co. as a petroleum engineer. Subsequently, he served as district superintendent of the Fellows district in California; and later as assistant division superintendent, Los Angeles Basin. During his career with the company, he also has held successively jobs as drilling superintendent, general superintendent and assistant manager of the Pacific Coast division.

Howard S. Andrews, T. Edward Berzin, James E. O'Reilly and **William A. Lohr,** all of whom rejoined Standard Oil Co. of New Jersey after military service, were recently promoted to foremen in the chemical products and Stanco White oil laboratories of the company.

R. N. Duncan has been appointed manager of Shell Oil Co., Inc.'s supply department in New York.

Floyd Ohliger, general manager of Arabian American Oil Co., is now in the United States on leave from his Arabian headquarters.

Charles van Bergen, vice president of Alliance Oil Corp., left New York late in June for a business trip to Europe.

Dr. E. T. Heck has resigned as geologist for the New York State Science Service at Albany, N. Y., to join Quaker State Oil Refining Corp. as chief geologist with headquarters in Bradford, Pa. In his new position, Heck succeeds **Dr. Parke A. Dickey,** who now directs the geological phase of research activity for Carter Oil Co.

Emil Kluth, Pacific Western Oil Corp., has been named chairman of the Conservation Committee of California Oil Producers. He succeeds **Joseph Jensen,** Tide Water Associated Oil Co. **Lot Bowen,** Western Gulf Oil Co., was named first vice chairman; **E. J. Bartosh,** Bankline Oil Co., second vice chairman, and **E. Robert Burns,** McDonald & Burns, secretary. Four representatives-at-large added to the membership are **V. P. Baker,** Independent Exploration Co.; **E. B. Hall,** Union Pacific Railroad Co.; **F. M. Ziegler,** Kern Oil Co., Ltd., and **Lloyd Williamson,** Lakeport Petroleum Co.

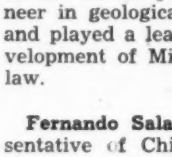
Floyd C. Brown, vice president and general manager of Natural Gas Pipe Line Co. of America since its organization, has been elected president, succeeding **W. Alton Jones,** who will serve as chairman of the board. Brown will continue as general manager. He has also been elected president of the Texoma Natural Gas Co. and the Quadrangle Gas Co. Brown joined the Empire companies organization in 1917 and in 1921 became manager of the Empire Pipe Line Co. and chief engineer of Empire companies in 1921. In 1923 he became assistant general manager of the Empire companies, and in 1926 was elected vice president.

Stanley P. Gildersleeve, manager, marine lubricating department of Standard Oil Co. of New Jersey, is now in Europe on company business.

Joseph Schneider, president of Union Trading Co., Inc., left the United States recently for an extended business trip to Europe.

R. A. Smith has retired as Michigan state geologist after many years' service in the position. He is a pioneer in geological work in the state and played a leading part in the development of Michigan's oil and gas law.

Fernando Salas, New York representative of Chile's Corporacion de Fomento de la Produccion (which is handling production operations in the Spring Hill area) left New York early in July for a business trip to Santiago.



LANGWORTHY

Donahue M. S. Langworthy left Tulsa July 6 for London, England, where he will be assistant to **W. B. Pyron,** European representative of Gulf Oil Corp. Langworthy is on terminal leave from the U. S. Army where he served as secretary of the Army-Navy Petroleum Board. He has the rank of lieutenant colonel. He has received the Legion of Merit award for his services. Before joining the Army he was connected with the production and executive departments of the Gulf company at Tulsa for 14 years.

R. T. Agster has joined the staff of Standard Oil Co. of California's product acceptance department as product engineer assigned to aviation problems. Agster recently returned from a special Army assignment in Alaska where he conducted experiments and flight-tests on aviation gasoline.

Charles A. Mayer has been named assistant engineer in the New York office of the Asphalt Institute. Mayer formerly was a partner in Dow & Smith, consulting paving engineers. During the war he participated in the construction of numerous Army air

bases in foreign countries. In his new position he will be an administrative engineering assistant to the general manager.

J. C. Barcklow, formerly Mid-Continent division sales manager, and more recently research geologist with Lane - Wells Co. at Dallas, has resigned to enter private practice as a consulting geologist with headquarters at Ada, Okla.

B. M. Stewart has been named director of industrial relations at Republic Oil Refining Co., Texas City, Tex. Stewart formerly was with The Texas Co.

Pat Mehollin, assistant district geologist at Tyler, Tex., for Sinclair-Prairie Oil Co., has been promoted to district geologist of the Panhandle area with headquarters at Amarillo.

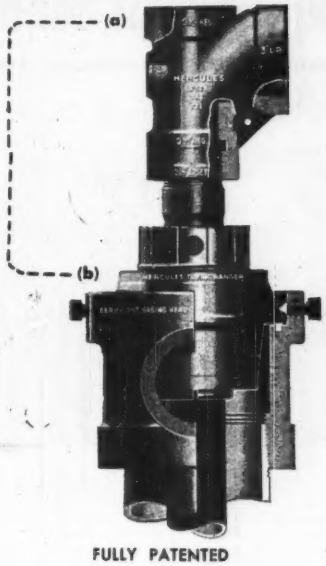
Dan Dunnett, recently released Army major, has been named a petroleum engineer of the conservation department of the Oklahoma Corporation Commission. Before the war, he was field engineer for Phillips Petroleum Co. in the Billings Wilcox pressure maintenance area of Noble County, Oklahoma.

R. C. Stewart, who was one of the chief pioneers in the development of submersible drilling barges and submersible boiler barges, has retired as division manager of the Louisiana-Arkansas division, producing department of The Texas Co. Stewart will be retained temporarily in an advisory capacity as consultant located at New Orleans. Entering the service of the company as a warehouseman in Evangeline field in 1908, Stewart was named division manager in 1926 and has had supervision of the company's largest division of domestic production 20 years.

SHIFTS—

R. E. Woods, geologist, General Petroleum Corp., Altadena, Calif., to Casper, Wyo.; **Roy C. Carpenter,** superintendent, Rocky Mountain Drilling Co., Rio Vista, Calif., to Chico, Calif.; **Frank S. Parker,** engineer, Signal Oil & Gas Co., Los Angeles to San Marino, Calif.; **I. C. Donegan,** engineer, Magnolia Pipe Line Co., Waskom, Tex., to DeLeon, Tex.; **Jolly S. Myers,** Magnolia Pipe Line Co., DeLeon, Tex., to Ringgold, Tex.; **Wayne A. Vaughn,** chemist, Rogers Lacy Refining Co., Dallas, Tex., to Big Sandy, Tex.; **Lewell Adair,** engineer, Atlantic Refining Co., Dallas to Odessa, Tex.; **E. I. Head,** engineer, Gulf Oil Corp., Monahans, Tex., to Ozona, Tex.; **Ray Bedingfield,** superintendent, New Wheles Drilling Co., Gretna, La., to Shreveport, La.; **M. J. Steger,** superintendent, New Wheles Drilling Co., Plaquemines, La., to Vacherie, La.; **Warren J. Souder,** geologist, The Texas Co., Mattoon, Ill., to Casper, Wyo.; **Wilson H. Holmes,** engineer, Romeo, Mich., to Tropical Oil Co., Bogota, Colombia, S. A.; **J. D. Wheeler,** engineer, Ohio Oil Co., Findlay, Ohio, to Grand Rapids, Mich.; **Joe A. Mullin,** engineer, Husky Refining Co., Cheyenne, Wyo., to Cody, Wyo.; **Carl Shepherd,** engineer, Clark & Cowden Gas Co., Marlow, Okla., to Liberal, Kans.; **Charles H. Hesser,** engineer, Stanolind Oil & Gas Co., Oklahoma City to Wewoka, Okla.; **W. L. Kistler, Jr.,** president, W. L. Kistler, Inc., Tulsa, to Santa Barbara, Calif.; **R. E. Miller,** vice president, Hanlon-Buchanan, Inc., Tulsa, to Houston; **W. B. Case,** engineer, Shell Oil Co., Inc., Tulsa to New York City; **Henry K. Holland, Jr.,** engineer, Magnolia Petroleum Co., Edna, Tex., to Wichita Falls, Tex.; **Lee M. Talbert,** engineer, Standard Oil Co. of California, Taft, Calif., to Coalinga, Calif.

Among the foreign visitors at the June meeting of the Los Angeles Nomads was this group: Front—Gordon H. Smith, W. C. Eyre, and Robert B. Laughbaro, all of Arabian American Oil Co.; and C. H. Major. Back—J. W. Clampitt, Iraq Petroleum Co., Ltd.; Florent H. Bailly, Pantepec Oil Co., Caracas, Venezuela; and J. P. O'Mara, Tipsa, Argentina



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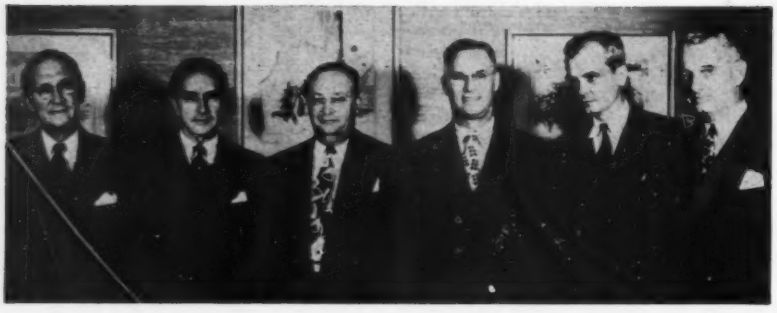

Officers of the newly installed Dallas chapter of Nomads: C. A. McClelland, International Derrick & Equipment Co., regent; Arthur A. Burrell, Cooper-Bessemer Co., vice president; Noble A. Endicott, Continental Supply Co., president; S. S. (Pete) Parker, National Tank Co., regent; R. B. Moody, Jarecki Manufacturing Co., assistant sergeant-at-arms; E. G. Schroeder, Lucey Products Corp., treasurer. Not in picture: L. A. (Pete) Little, Lufkin Foundry & Machinery Co., secretary, and R. J. Bauer, Gardner Denver Co., sergeant-at-arms. (Story on the organization of the Dallas chapter appeared on page 73, July 6 issue of the Journal.)

Kerrigan Heads Inco's Nickel Sales Department

Appointment of Walter C. Kerrigan as manager of the nickel sales department of The International Nickel Co., Inc., to succeed the late Rudolph L. Suhl, is announced by Dr. John F. Thompson, executive vice president. Kerrigan joined International Nickel in 1930 and has been an assistant manager of its nickel sales department since January 1933.

Todd Succeeds Bemis

E. H. TODD

Emerson H. Todd has been appointed sales manager of American Cable and Hazard Wire Rope divisions of American Chain & Cable Co., Inc., succeeding Frank W. Bemis, who resigned to enter another line of business. Todd will make his headquarters at Wilkes-Barre, Pa. He has been with the company since 1925, and for the past several years has been Chicago district sales manager for American Cable and Hazard Wire Rope divisions.

George Gunther, who was with the company prior to service with the armed forces, has been appointed Chicago district manager for the wire-rope divisions succeeding Todd.

Franklin Supply Opens New Warehouse

Franklin Supply Co. announces opening of its East Chicago, Ind., warehouse. The new location is under the management of Roy Wood and Kenny Goodell. Substantial stocks of refinery equipment and supplies are being carried in the new warehouse to service the various refiners in the Great Lakes area.

A new Michigan warehouse has been opened by the firm at Linwood, under the supervision of Larry Harper. This unit will serve the industry of the eastern portion of the state.

The following new personnel has been attached to Chicago head office:

Don Ernest, formerly with Universal Oil Products Co., Chicago, in charge of sales engineering.

Frank Dorney, formerly with the pipe division of Republic Steel Corp., Cleveland, is now manager of tubular sales.

Ed Farrell has recently been transferred from the Mount Vernon, Ill., warehouse to Chicago and appointed purchasing agent.

Brainard Leaves Beaumont Iron Works

A. I. Brainard has resigned as president of Beaumont Iron Works Co., subsidiary of American Locomotive Co., but will act in a consulting capacity until January 1, 1947. Brainard has not announced his future plans.

Bannan Elected President Of A.G.M.A.

Distinctive recognition has been given to western manufacturing in the election of Thomas J. Bannan as president of the American Gear Manufacturers Association at its annual convention in Hot Springs, Va. Bannan is president and general manager of Western Gear Works, with plants in Seattle and Los Angeles, as well as an associate plant, Pacific Gear & Tool Works of San Francisco.

Vaughn Named National's Texas Division Credit Manager

H. H. VAUGHN

Herman H. Vaughn, who has been treasury and credit representative in the Houston office of The National Supply Co., has been named credit manager of the company's Texas division with offices in Fort Worth, according to an announcement by A. T. Huizinga, vice president and treasurer. He succeeds Ralph B. Wasson, who retires after 45 years of continuous service. Before coming to National Supply in January 1944, Vaughn had been in the banking business in Nashville and Tulsa, and assistant credit manager of Frick-Reid Supply Corp.

Three Join Petroleum Equipment

Robert W. Duden, president of Petroleum Equipment, Inc., announces the association of F. D. Morgan, J. Howard Kinslow, and T. C. Cannon with this organization. Morgan and Kinslow were formerly with Lucey Products Corp. as comanagers of the steam, power, and heating division, and T. C. Cannon served under them with the same company. Their new duties with this organization will be the establishment of a similar department.

NOMADS PRESENT BROWN TROPHY TO CLIFFORD PERRY

Following the annual Nomad golf outing at Westchester Country Club, Clifford B. Perry, Westinghouse Electric International Co., was presented with the I. Frank Brown memorial trophy by Mrs. Novella Brown, Frank Brown's widow. Shown above at a scene following the tournament and dinner, are: James G. Burnett, Heat Transfer Products, Inc.; Russell D. Heath, export representative; S. D. Beckley, Brown & Beckley; John H. Baird, export representative and president of New York Nomads; James Clark, Standard Oil Co. of New Jersey; Mrs. Brown, Brown & Beckley; Perry; L. F. McCollum, Standard Oil Co. (N.J.); W. J. Campbell, Petroleum Machinery Corp.; Val R. Wittich, export representative; and George W. Knight, Rheem Manufacturing Co. Frank Brown was a former Nomad.

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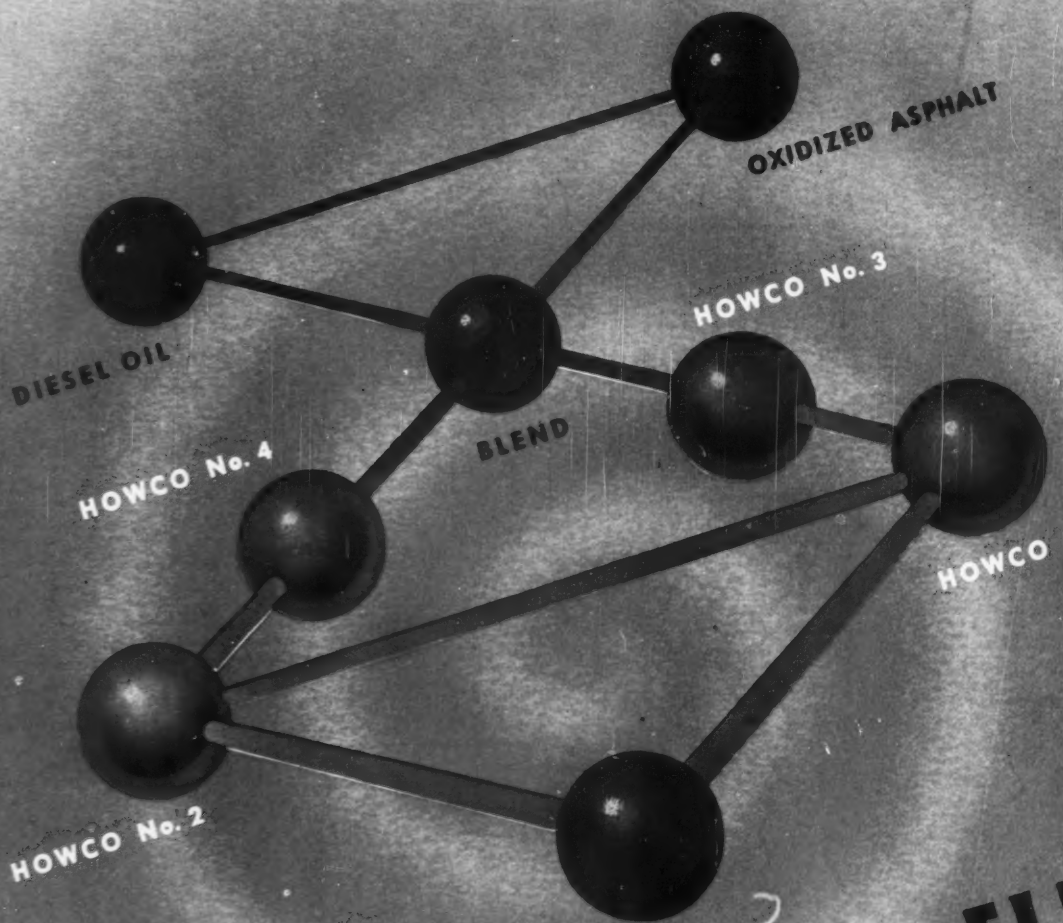

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